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Cover photograph: The wasp *Argogorytes mystaceus* (L.) (Crabonidae) pollinating a fly orchid *Ophrys insectifera*, Kent, June, 2009. (Photo: Grant Hazlehurst).

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ADULT CADDISFLIES (TRICHOPTERA) COLLECTED IN WALES AND SHROPSHIRE IN JULY 2008

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Abstract

Adult caddisfly (Trichoptera) records from Wales and Shropshire are reported. Forty-eight species from 25 localities were found during July 2008. The most important records were of *Oecetis notata* (Rambur) and *Ylodes simulans* (Tjeder), both RDB3 species and photographs of these were taken.

Introduction

Funding supplied from the Maitland Emmet BENHS Research Fund enabled the author to spend two weeks in Wales and Shropshire from 14–24 July 2008, collecting adult caddisflies. The purpose of the trip was to take live photographs of adult caddisflies and collect in areas not previously visited. The specimens collected have been very useful for testing the handbook by Barnard & Ross (in prep.). New photographs will help to expand on Barnard & Ross (2008) to enable the identification of live specimens where possible, especially when a photographic record can be sufficient for some unmistakable species. This work is still in its early stages, so is being done with caution. There seems to be a lot more to learn about this group and it is often still necessary to collect a specimen to confirm identification. There are often features in a photograph of a live individual, for example colour pattern, eye colour and antennal banding that are not apparent or so vivid in a dead specimen; some of these appear to be useful features for identification, some less so, but nevertheless illustrate the variability within some species.

Methods

Only adult caddisflies were recorded and not the larvae. Prior research was undertaken to decide which localities to visit. The plan was to visit a range of habitat types and hopefully to find some of the less common species. Due to time constraints less time was spent specifically looking for rare species, and most time was concentrated on visiting localities and habitats where there was likely to be a higher richness of species. Localities were chosen based on type of water habitat (knowing that certain species prefer certain habitat types), water flow, previous records of caddisflies and their flight times.

Only general notes on the biology and habitat requirements of species are given here, as this information is largely deduced from the larvae. All British species of caddisfly apart from one spend most of their lifecycle in the water as larvae. The larvae are also considered to be useful as indicators of freshwater quality and river classification (Wright, Sutcliffe & Furse, 2000; Riverfly Partnership, 2007). More research into individual caddisfly species sensitivity and environmental requirements may reveal greater differences in sensitivity between species, for example making some species even more useful for monitoring environmental change.

The adults can fly, making it hard to pinpoint the original habitat of the species but they are inextricably linked to water. The adults look for a mate and suitable

water to lay their eggs. They can be seen swarming over water, resting on nearby vegetation or even flying high up in the canopy. Some are strong fliers and have been found at least a kilometre away from suitable breeding habitats (J. Badmin, pers. comm.).

From experience, recording adults is important because some larvae can be elusive and hard to find. For some species only the adult has been found in a particular area. Even if adult caddisflies have been previously recorded at a particular site, they can remain elusive because of small numbers, presence of a full moon (when light-trapping), bad weather on the day and before a visit (although caddisflies have been seen flying in the rain), the time of day spent searching (particularly on hot days as they seem to prefer cool, shady places, hiding deep in grassy tussocks or on underside of vegetation) or in high winds when they take shelter. They also tend to swarm at dawn and dusk or can be seen in small numbers flying over the surface of the water particularly in cooler spots where there is shade.

Sites

The field work commenced in Powys, then proceeded north-west through Carmarthenshire into Ceredigion, then north-east back through Powys into Wrexham, then south into Shropshire staying a few days at the Preston Montford Field Studies Centre. From there heading north-west into Denbighshire (see Fig. 1).

The weather was generally cloudy and cool with the occasional shower during the first week, though was sunnier, drier and warmer during the second week. On the whole the weather was remarkably good, as it was generally a wet summer in western regions of the UK in 2008.

Most time was spent next to rivers, with mixed results. Some localities did not yield the expected species. This could have been due to several factors, not least the time of day spent collecting and the limited time in which to do it, as mentioned above. Most collecting was done either by just tubing specimens as they were seen or by using a net for sweeping. Sweeping was done at various heights with an extension handle reaching into the canopy but most often on lower vegetation next to water. Light-trapping was carried out when allowed.

Details of the individual localities are given below including grid reference, date of visit and general habitat information.

AC, Afon Clywedog, Rhyd-y-cilgwyn, near Rhewl, Denbighshire, Wales [SJ 106 597], 24.vii.2008. Small river, slow to medium flow over bedrock, high banks on either side; large shrubs and trees overhanging water.

AG, Afon Gwydderig, Glandwr, Carmarthenshire, Wales, [SN 803 353], 15.vii.2008. Main stream with muddy pools, small stones and in places faster flows over small waterfalls on bedrock; small shrubs and trees overhanging water. Small trickles into main stream over pebbles.

CAN, Llangollen Canal, Shropshire/Wales border [SJ 482 354], 18.vii.2008. Canal bordered by peat bog (Whixall Moss) on one side.

CC1, CC2, Cors Caron (=Tregaron Bog), near Tregaron, Ceredigion, Wales, **CC1** [SN 688 626], **CC2** [SN 691 624], 16.vii.2008. CC1 Peat bog with marshy ponds and reed beds. CC2 Small fast flowing stream feeding into the bog.

CR, River Clwyd, Glan Clwyd, near Rhewl, Denbighshire, Wales [SJ 116 616–119 608], 24.vii.2008. Small river, slow flow, shallow over small/medium stones; small trees and shrubs overhanging water.

DC, River Dee, Ty Nant, near Carrog, Denbighshire, Wales [SJ 120 438–122 437], 24.vii.2008. River, medium flow over boulders and medium stones.

Fig. 1. Map of Wales showing the counties and localities where caddisflies were recorded during July 2008.

DL, River Dee, Llangollen, Denbighshire, Wales [SJ 213 421], 23.vii.2008. River, fast flowing over boulders and bedrock.
FSC, pond, Field Studies Centre, Preston Montford, Shropshire [SJ 434 144], 21–22.vii.2008. Pond, man-made with reed bed, within few hundred metres of the River Severn and other man-made ponds.
G, Glaslyn (lake, east side), Powys, Wales [SN 829 941], 17.vii.2008. Large lake at altitude, pebbly shore; some soft rush.
HM, Hanmer Mere (east side), Hanmer, Wrexham, Wales [SJ 455 394], 18.vii.2008. Lake next to woodland, overhanging trees and vegetation.
LC, Llyn Clywedog Reservoir (east side), near Llanidloes, Powys, Wales [SN 920 884], 17.vii.2008. Large reservoir, shrubs and small trees.
PB, River Perry, Platt Bridge, Ruyton-XI-Towns, Shropshire [SJ 344 222], 20.vii.2008. Small river, medium speed; overhanging vegetation.
PF, River Perry, Fitz Mill, Shropshire [SJ 443 180], 20.vii.2008. Small river, medium speed; overhanging vegetation.
PM, River Perry, Mytton Mill, Shropshire [SJ 440 175], 20.vii.2008. Small river, medium speed; overhanging vegetation.
RB, Rea Brook, Meole Brace, Shrewsbury, Shropshire [SJ 484 101], 21.vii.2008. Small stream feeding into the River Severn; overhanging vegetation.

Table 1. Species of Trichoptera recorded in Wales and Shropshire during July 2008.

Beraeidae
Beraea maurus (Curtis) TD
Beraea pullata (Curtis) AG

Glossosomatidae
Agapetus delicatulus McLachlan T
Glossosoma boltoni Curtis CR, FSC
Glossosoma conformis Neboiss T

Goeridae
Goera pilosa (Fabr.) PM, SL, T, UC
Silo pallipes (Fabr.) TSF

Hydropsychidae
Cheumatopsyche lepida (Pictet) AG, FSC
Hydropsyche angustipennis (Curtis) SL
Hydropsyche contubernalis McLachlan FSC
Hydropsyche fulvipes (Curtis) T
Hydropsyche instabilis (Curtis) T
Hydropsyche siltalai (Döhler) DC, SL, T, UC
Hydropsyche pellucidula (Curtis) CR, FSC, PB, SL, T

Lepidostomatidae
Lepidostoma basale (Kolenati) RB
Lepidostoma hirtum (Fabr.) DC, SL, T

Leptoceridae
Athripsodes albifrons (L.) DC, PF, T
Athripsodes aterrimus (Stephens) HM
Athripsodes bilineatus (L.) SL, TSF
Athripsodes cinereus (Curtis) LC, T, TD, S, SS, UR
Ceraclea albimacula (Rambur) FSC, T
Ceraclea dissimilis (Stephens) SS, T
Ceraclea fulva (Rambur) FSC, T
Ceraclea nigronervosa (Retzius) FSC
Mystacides azurea (L.) LC, PB, RB, S, SL, SS, TSF, UC
Oecetis notata (Rambur) **RDB3** FSC, S, SB
Ylodes simulans (Tjeder) **RDB3** DC

Limnephilidae
Glyphotaelius pellucidus (Retzius) T
Limnephilus auricula Curtis WEM
Limnephilus flavicornis (Fabr.) FSC
Limnephilus lunatus Curtis FSC
Limnephilus luridus Curtis WEM
Limnephilus marmoratus Curtis FSC
Limnephilus rhombicus (L.) T
Potamophylax latipennis (Curtis) CR, SL, T

Molannidae
Molanna albicans (Zetterstedt) G

Odontoceridae
Odontocerum albicorne (Scopoli) AG

Philopotamidae
Philopotamus montanus (Donovan) CC2

Phryganeidae
Oligotricha striata (L.) WM
Trichostegia minor (Curtis) WEM

Polycentropodidae
Cyrnus trimaculatus (Curtis) CAN, DL, SB

Psychomyiidae
Lype phaeopa (Stephens) AC, PM, S
Psychomyia pusilla (Fabr.) DC, FSC, RB, UB, UC
Tinodes assimilis McLachlan T
Tinodes waeneri (L.) CAN, SB

Rhyacophilidae
Rhyacophila dorsalis (Curtis) DC, RB, SL
Rhyacophila munda McLachlan T

Sericostomatidae
Sericostoma personatum (Spence) CC1, UC, T

S, SB, SS River Severn, Shrewsbury, Shropshire, **S** [SJ 487 122–488 128], **SB** [SJ 495 122–496 124], **SS** [SJ 481 135–486 131], 19.vii.2008. Large river, medium flow; large trees and shrubs overhanging water in places.

SL, River Severn, Llandinam Gravels, Neauddllwyd, near Llandinam, Powys, Wales [SO 023 873], 16.vii.2008. River, medium flow, gravel banks; few small trees and shrubs overhanging the water.

T, River Teifi, Dolaugwyrddon isaf, near Lampeter, Ceredigion/Carmarthenshire border, Wales, [SN 552 463–559 463], 15–16.vii.2008. River, slow to medium flow, gravel banks; large trees and shrubs and vegetation overhanging water in places; reeds. Ponds in cattle fields nearby.

TD, River Towy, south of bridge, Dolauhirion, nr Llandovery, Carmarthenshire, Wales, [SN 762 360], 15.vii.2008. River, fast flow over boulders and bedrock; large trees, shrubs and vegetation overhanging the water.
TSF, River Teifi, Strata Florida, Ceredigion, Wales, [SN 746 658], 16.vii.2008. Small river, slow to medium flow over pebbles.
UB, River Usk, near Dinas Road, Brecon, Powys, Wales, [SO 043 284], 15.vii.2008. River, medium flow over small/medium stones, sandy banks; with nearby trees, shrubs and vegetation.
UC, River Usk, Crickhowell, Powys, Wales, [SO 206 189–217 179], 14–15.vii.2008. River, medium flow over small/medium stones, sandy banks; overhanging trees, shrubs and vegetation.
UR, Usk Reservoir (east end), Powys, Wales, [SN 833 286], 15.vii.2008. Reservoir with concrete side; some vegetation.
WEM, Wem Moss, near Northwood, Shropshire [SJ 472 342], 18.vii.2008. Peat bog, firm; small tree saplings taking root but mostly heather and grasses. Small stream running along one edge of the bog.
WM, Whixall Moss, Shropshire/Wales border [SJ 484 361], 18.vii.2008. Peat bog; heathers, sundews, reeds, grasses, small trees.

Results

A Skinner light-trap was used at four localities. At the River Teifi, near Lampeter, the local farmer allowed me to set up the light-trap and to camp nearby. It was a warm and dry evening (15.vii.2008) and the yield was abundant and diverse, considering there was a full moon that evening, which would have competed with the light from the trap. I estimate that 1000 caddisflies were attracted to the light-trap, belonging to 19 species. The landowner was an organic farmer and he indicated that other local landowners were keen to improve the water quality of the river. This area is a designated Special Area of Conservation (SAC). The light-trap was also set up on the River Severn at Llandinam Gravels (16.vii.2008), Wem Moss (18.vii.2008) and at the Preston Montford Field Studies Centre (21.vii.2008).

Forty-eight species of caddis were recorded from 25 localities. One or two examples of a taxon were collected for reference from each locality. Photographs of live specimens were taken usually on the following morning when they were less active. The species recorded are listed in Table 1, together with locality codes and rarity status.

Of the species listed in Table 1, according to Wallace (1991) most are common except for *Oecetis notata* (Rambur) (Plate1, Fig. 1) and *Ylodes simulans* (Tjeder) (Plate1, Fig. 2), both of which are RDB3 species. Two specimens of *O. notata* were collected from two stretches along the River Severn at Shrewsbury. The species was last recorded here in 1937 (Ian Wallace, pers. comm.). A couple of days later, a third specimen of *O. notata* was taken at the Skinner trap at Preston Montford Field Studies Centre which probably also came from the nearby River Severn. It is possible that numbers of this species are increasing in this area, as interestingly none was recorded in the Rothamsted trap at Preston Montford which started operation in 1978 and nearby river searches until Ian Wallace (pers. comm.) collected a larva from near the Montford Bridge on 16.v.2005.

A single specimen of the RDB3 leptocerid *Y. simulans* was collected from the River Dee near Carrog on 24.vii.2008. This species has been recorded from two other rivers in Wales (Western Cleddau and Teifi), the Forth in Perthshire and an unconfirmed record from the River Teme in Shropshire (Wallace, 1991). It is interesting to note that a larva of this species was found near Carrog on 10.vi.2007 by Ian Wallace confirming the caddis' continued presence in this locality.

Photographs of live specimens were taken, including species not figured in Barnard & Ross (2008) (see Plates 1–3). Species of the genus *Hydropsyche* are notoriously difficult to identify; it can be done using the genitalia as the species are highly variable and can look superficially identical to one another, even in life. *Hydropsyche pellucidula* (Curtis) can be pale with no wing pattern or dark with variable forewing patterns. The males of *H. instabilis* (Curtis), *H. siltalai* (Döhler) and *H. fulvipes* (Curtis) can have almost identical colour pattern and are similar in size. Mosely (1939) stated that *H. fulvipes* had brownish-yellow and broad (in dorsal view) wings, as opposed to the grey and narrow *H. instabilis*. However, it was later decided that his *H. instabilis* was actually *H. siltalai* and that both these species can also have brownish-yellow wing patterns (see Plate 2, Figs 1 & 2, Badcock, 1977). Recent photos also show that *siltalai* can rest with either their wings slightly apart or fully closed in dorsal view (see Plate 2, Figs. 2 & 3).

Most of the species were found where you would expect them to occur according to the descriptions of habitats given in Wallace (1991), but there were some anomalies, with some river-inhabiting species attracted to the light trap set up by the pond at Preston Montford FSC. It is likely that these species came from the River Severn which is within a few hundred metres. Although *Beraea maurus* (Curtis) was found by the River Towy it would have lived as larvae in a nearby spring or trickle of freshwater. *Philopotamus montanus* (Donovan) is only found near cool fast-flowing streams, so it was no surprise to find a specimen in a stream that fed into Tregaron peat bog rather than in the vegetation surrounding the bog itself. *Glyphotaelius pellucidus* (Retzius) and *Limnephilus rhombicus* (L.) were attracted to the light-trap set by the River Teifi, however these species probably lived as larvae in nearby ponds. *Sericostoma personatum* (Spence) was found at Cors Caron bog, though it probably emerged from the River Teifi nearby. The discovery of *Tinodes assimilis* McLachlan by the River Teifi was also unexpected as the larvae are associated with trickles on vertical rock faces, and so it is assumed there must have been a habitat similar to this nearby.

Acknowledgements

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THE IMPACT OF THE M40 MOTORWAY ON POPULATIONS OF CHALKHILL BLUE *LYSANDRA CORIDON* AND SILVER-SPOTTED SKIPPER *HESPERIA COMMA* AT ASTON ROWANT NATIONAL NATURE RESERVE

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ABSTRACT

In 2001 a study was undertaken to examine the impact of the M40 motorway on the dispersal of two relatively sedentary butterflies, the Chalkhill Blue *Lysandra coridon* (Poda), and Silver-spotted Skipper *Hesperia comma* (L.), which have a restricted distribution in the UK. Fieldwork was carried out from first emergences in mid July through to mid September when weather conditions deteriorated and no butterflies were seen. Individuals were marked specifically to identify their capture location. Records were taken of numbers caught, weather conditions and inter-site movements. A total of twelve individuals (one female and eleven male *L. coridon*) were recorded moving between areas with five males crossing the motorway. No records of *H. comma* moving between areas were observed. The study concluded that inter-site movement was limited both by intervening areas of unfavourable habitat (scrub and woodland) and by the M40. These factors are likely to have a detrimental effect on the population viability of both species studied, in particular the more sedentary *H. comma*. The barrier effects associated with habitats on these two sedentary species could be resolved through habitat management regime changes. However, the scope to resolve problems associated with motorways is more complicated with only a few tried and tested examples of retro-fit 'green bridges' existing in Europe, which were constructed primarily for the use of mammals.

INTRODUCTION

Roads often function as important 'green corridors', linking disparate habitats and providing an opportunity for species dispersal. Studies have shown that the central reservations and verges of motorways and major roads in Europe often support high densities of insects from a wide range of taxa including Coleoptera (beetles), Syrphidae (hoverflies), aculeate Hymenoptera (ants, bees and wasps), Hemiptera (bugs) and Lepidoptera (butterflies and moths) (Feltwell & Philp, 1980; Highways Agency, 2000). In the UK, road verges also provide habitats for a wide range of other groups such as mammals (more than twenty species), particularly rodents and lagomorphs, and reptiles (all six species) and over 800 plants (Way, 1977).

The detrimental effects of roads on wildlife through both loss of habitat and habitat fragmentation are well known. Roads can also form barriers to the dispersal of species (referred to as the 'barrier effect'). This has been researched for many years through studies on road casualties, particularly for a number of mammal species (Oxley, Fenton & Carmody, 1973) and birds (Slater, 1994). Many invertebrate species are also adversely affected by roads, particularly where roads bisect existing habitats (Mader, 1984). An early study suggested that the M56 was a barrier to the dispersal of the normally mobile Orange-tip *Anthocaris cardamines* (Verity) (Dennis,

1986) and other work on the effects of habitat fragmentation on invertebrate species has demonstrated that sub-populations are easily isolated thus preventing gene flow (Lacy & Lindenmayer, 1995). However, a study conducted on the more common British butterfly species, such as the Small White *Pieris rapae* (L.), concluded that roads did not have a huge affect on their dispersal (Munguira & Thomas, 1992). By contrast, few data exist on the impacts of habitat fragmentation by road networks on restricted range or declining butterfly species, especially in the UK.

In the UK, the only known study specifically aimed at investigating whether trunk roads represent a barrier to butterflies was undertaken by the Centre for Ecology and Hydrology in 1996 (Thomas, Snazell & Ward, 2002) using a mark-recapture technique on the Chalkhill Blue butterfly *Lysandra coridon* (Poda), at the Bar End to Compton section of the M3 motorway, which was routed through Twyford Down in the early 1990s. The study found that individuals had moved between areas on the same side of the motorway, and that small numbers were crossing the motorway. It was therefore concluded that the butterfly populations at the three areas studied interacted with each other sufficiently to still be considered a meta-population, and that the road had not had a major impact on the population distribution of these butterflies during the period of the survey.

This case study was undertaken to investigate the impact of the M40 motorway on *H. comma* (L.) and *L. coridon*, both of which are relatively sedentary localised butterflies restricted to unimproved chalk and limestone grasslands (Asher *et al.*, 2001).

A study on *H. comma* in 2001 showed that this species, although spreading, has not expanded in range in the UK as much as expected over the previous 20 years, mainly due to habitat degradation and fragmentation (Davies *et al.*, 2001). Recent research has also indicated that this species, although at its northern climatic limit in Britain, has the ability to colonise new sites within 1km of existing populations and occasionally sites up to 8.5 km away, although these new colonies are frequently not self sustaining (Butterfly Conservation, 2005). Work on dispersal and extinction in fragmented landscapes has indicated that species of intermediate or low mobility have declined most and that habitat fragmentation is likely to result in non-random extinction of populations and species (Thomas, 2000).

Materials and methods

Survey area

Aston Rowant National Nature Reserve (NNR) and Special Area for Conservation (SAC), on the borders of Oxfordshire and Buckinghamshire (centred on SU730967), was selected as a suitable study site not only because it contains populations of both *L. coridon* and *H. comma*, but because the site can be separated into three blocks of suitable habitat divided by either woodland and scrub or the M40 motorway which was constructed in the early 1970s, resulting in habitat fragmentation and degradation in areas immediately adjacent to the motorway.

Aston Rowant has three main areas supporting populations of both *L. coridon* and *H. comma* (Fig. 1). These are primarily managed as chalk downland through sheep grazing and each area is separated by a minimum of 100m of unsuitable habitat:

(i) Area A: 1.31ha of south-west facing chalk downland north of the M40.

(ii) Area B: the combe (valley) to the south of the M40, comprising 0.47ha of south-west-facing chalk downland and 0.87ha of less species-rich north-east-facing habitat.

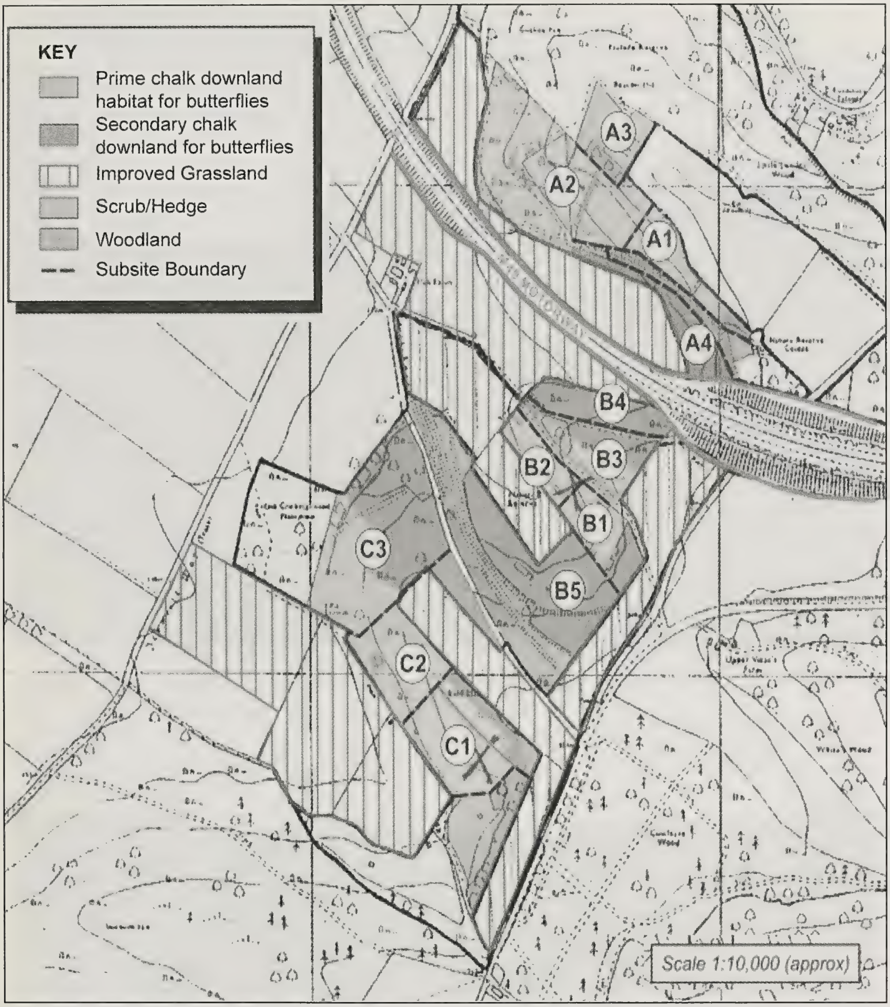

Fig. 1. Habitat map of Aston Rowant National Nature Reserve. Based on Ordnance Survey mapping © Crown copyright. AM 004/10.

(iii) Area C: the combe south of Site B, not adjacent to the M40 comprising 1.44ha of south-west-facing habitat.

Each area was subdivided in to smaller areas (A1, A2, A3, etc) as indicated on the map to enable the sequence of sampling to be altered each day. In this way it was hoped that no biases in sampling would be introduced with respect to time of day of capture for each of the main study sites.

The M40 bisects areas A and B resulting in habitat fragmentation (Fig. 2). Area C was included as a control, to investigate whether separation of suitable habitats for both butterfly species by un-favourable habitats, such as woodlands and scrub, had a similar effect as the motorway.

Fig. 2. Study area A (top photograph) and study area B (lower photograph) at Aston Rowant National Nature Reserve, 2001. The two areas are separated by the M40 motorway.

Methods

Fieldwork was conducted on week days throughout the flight period of both species. This commenced in mid July 2001 and was completed by mid September 2001, by which time the weather was unsuitable for flight activity for both species. The three main areas within the study site were sampled daily when weather conditions were suitable. Individuals of both species were caught using standard kite butterfly nets, marked with an area specific identifier, and released immediately. The methods used followed guidelines set out in 'Ecological Methods' by Southwood & Henderson (2000). The identifying marks were made at the apex/sub-apex of the upper side of the forewing with an Edding 124F OHP permanent marker pen (Thomas *et al.*, 1996). Marked individuals originating from another area were then marked with new specific identifiers. In this way, individuals had various wing colour markings showing their migration history.

Wind speed (mph), temperature (°C) and wind direction (north, south, east or west) were recorded using a Silva Alba wind watch (supplied by Alana Ecology www.elanaecology.com) and cloud cover was noted at the start and middle of each survey day. This was to ensure that any changes in prevailing weather conditions that might influence catch numbers or migration between areas was recorded.

Weather conditions during the study period were generally favourable. The majority of days ranged from sunny to cloudy but bright (35/41 days). The ground conditions were generally dry (28/41 days) or wet initially, drying out later (7/41 days). Temperatures ranged from 17–31°C but almost always exceeded 20°C (35/41 days). Wind speed ranged from 0–12 mph, but was mostly 3–6 mph (22/41 days). Wind direction was mostly south-east (11/41) or north-west (9/41 days), which corresponded to wind travelling up and down the valleys. The weather was also fine over most of the intervening weekends.

When the weather was sub-optimal, the areas were walked nonetheless, as individuals would often fly up from the grass when disturbed. These were also captured and marked.

The data collected were based on the number of individuals marked rather than number of individuals seen (and therefore numbers tailed off towards the end of the season). For the purpose of the graphs (Figs 4–6), the numbers of females caught were adjusted to take into account the differences in sex ratios (1 male to 3.75 females) so that the numbers caught in different weather conditions could be compared directly.

Results

L. coridon

A total of 1797 individuals of *L. coridon* were marked across the three study areas at Aston Rowant NNR between mid-July and mid-September 2001 (Table 1). Males outnumbered females at each of the three study areas, ranging from 73–82% of the total catch at each site. The largest numbers were found at Site A (1182), followed by C (342) and B (273). Coverage was considered to be good, as the number of new markings tailed off towards the end of the day and through the season when very few unmarked individuals were seen.

Males were noted as being far more active than females, regularly flying between feeding patches and involved in chasing females. Individual males were occasionally observed flying over scrub and trees. Females generally walked through the vegetation or flew close to the ground, and while generally less active than males, were seen on occasion to fly over low scrub.

Table 1. Total numbers of *Lysandra coridon* marked at Aston Rowant NNR, 2001.

Area	No. marked		
	Males	Females	Total
Site A	964	218	1182
Site B	207	66	273
Site C	248	94	342
Total	**1419**	**378**	**1797**

A total of 12 movements between areas representing 12 individuals (11 males and one female) were recorded during the survey period with two individuals moving between opposite valleys within Area B on the same side of the motorway (Fig. 3). The observed movements were:

(i) Five males crossed the motorway (3 from C to A; 1 from A to B; and 1 from B to A).
(ii) Six males and 1 female crossed between B and C (2 males and 1 female from C to B; and four males from B to C).

Thus slightly more butterflies crossed the motorway in a northerly than a southerly direction and that more movements occurred between areas B and C on the same side of the motorway than between these areas and Area A. The distance of emigrations varied from approximately 350 m for movement between Areas B and C and up to 1100 m for movement between C and A (Fig. 3).

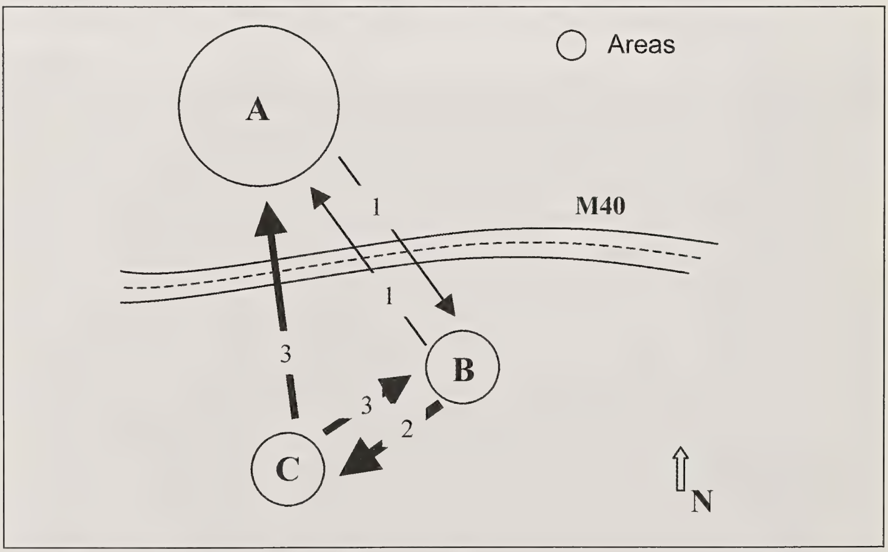

Fig. 3. Schematic diagram showing movement of *Lysandra coridon* between Areas at Aston Rowant NNR during 2001 (the size of the circle and the width of the arrows depict the relative size of the sites and the frequency of movement).

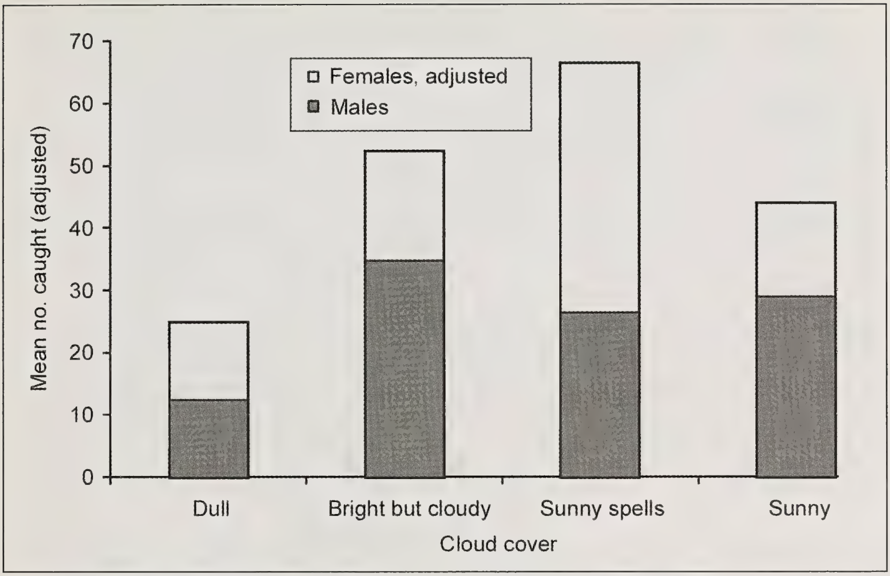

Fig. 4. The effect of weather conditions on catch rate of *Lysandra coridon*.

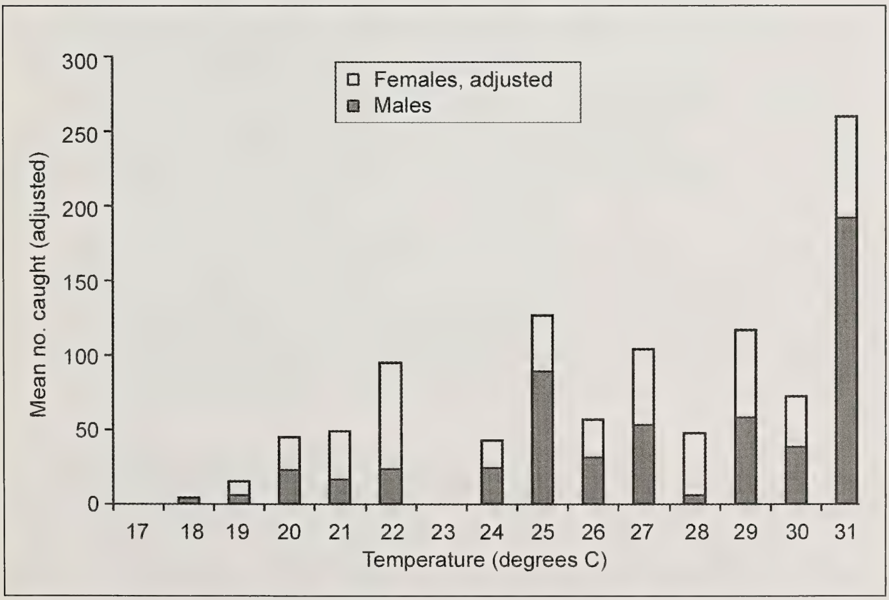

Fig. 5. The relationship between catch rate and temperature for *Lysandra coridon*.

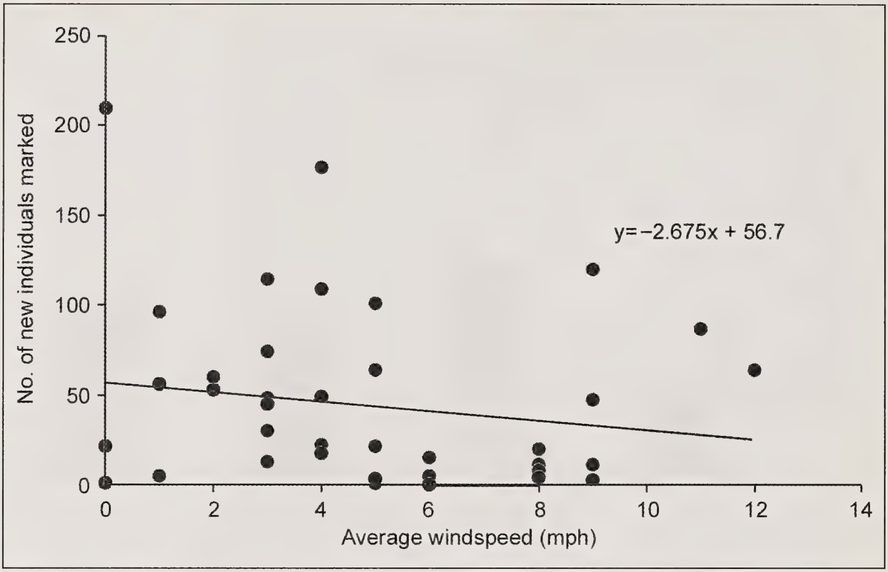

Fig. 6. Influence of wind speed on daily catch rate of *Lysandra coridon*.

The effect of weather conditions

The majority of *L. coridon* adults in flight were caught when conditions were generally bright, either in clear sunshine, during days with sunny spells or when there was a thin layer of cloud (Fig. 4). There was no obvious difference in flight preference between males and females when numbers were adjusted.

Most *L. coridon* adults were caught in flight at temperatures above 20°C, with highest numbers observed flying at 31°C (Fig. 5). The minimum temperature at which adult *L. coridon* were caught in flight was 18°C. There was a slight reduction in the number of individuals caught flying at higher wind speeds (Fig. 6), though the effect was not considered statistically significant over the range of wind speeds encountered. There was no obvious difference between males and females in respect to wind speed (data points not shown).

Direct observation indicated that individuals of *L. coridon* were able to disperse over longer distances on windier days as a result of being caught and carried by the prevailing winds which were predominantly (c.50%) along a NW–SE axis.

H. comma

A total of 1262 individuals of *H. comma* were marked between August and the middle of September 2001 (Table 2). The largest population of *H. comma* was found in Area A (741 individuals), followed by C (349) and B (251). The ratio of male to female was roughly equal in each of the three areas, with the percentage of males being 51%, 52% and 43% in areas A, B and C, respectively. Coverage of *H. comma* was not considered to be as good as that for *L. coridon*, due to their shorter life expectancy, and the fact that their flight pattern and colouring made them more difficult to catch.

Table 2. Numbers of flying *H. comma* marked and released at Aston Rowant NNR, 2001.

Area	No. marked		
	Males	Females	Total
A	376	365	**741**
B	131	120	**251**
C	149	200	**349**
Total	**625**	**637**	**1262**

Males were more active than females with the latter often making shorter flights when disturbed and were therefore easier to catch. Both sexes were very occasionally observed to fly up and over scrub over 2 m high when disturbed.

One individual was found to have dispersed between adjacent sides of the valley in Area B, but none had dispersed between areas such as across the motorway.

The effect of weather conditions

The behaviour of adult *H. comma* was noticeably affected by ambient weather conditions. The minimum temperature for flight activity recorded was 19°C, with maximum numbers observed flying at 29°C. (Fig. 7). More individuals were observed flying and were marked when the weather was sunny or there were long sunny spells than when the weather was distinctly cloudy or dull (Fig. 8). This supported observations that the butterflies dropped into the grass as soon as the sun disappeared, and would emerge after a few minutes of sunshine. Sample sizes were not large enough to determine whether there was any difference between male and female behaviour under different sunlight conditions.

The occurrence of wind was less important than sunny conditions in controlling the numbers of *H. comma* flying on any given day. Wind speed did not appear to have a deleterious effect on the number of adults flying over the range of wind conditions observed. There was also no apparent difference between the sexes.

Discussion

This study provided an opportunity to examine the impact of habitat fragmentation caused by the M40 motorway and other local natural habitat features on the ability of populations of both *L. coridon* and *H. comma* to disperse between areas. A number of potential barriers were found to occur between each of the study areas, which affected butterfly movement within the downland complex and these are listed in Table 3.

Inter-site movement recorded in this study was limited to 12 individuals of *L. coridon* constituting 0.66% of the total marked population of this species of which the majority were males (79%). Inter-site movement was greater between study areas B and C which were separated by blocks of unsuitable habitat than between study area A and B/C which were separated by the physical barrier of the dual-carriage motorway and its steep-sided cuttings. This indicated that the M40 appeared to have a greater impact on butterfly dispersal than natural habitat ‘fragmentation’. Even so, limited migration took place between the three study areas suggesting that these subpopulations may still be considered to act as a single meta-population for this

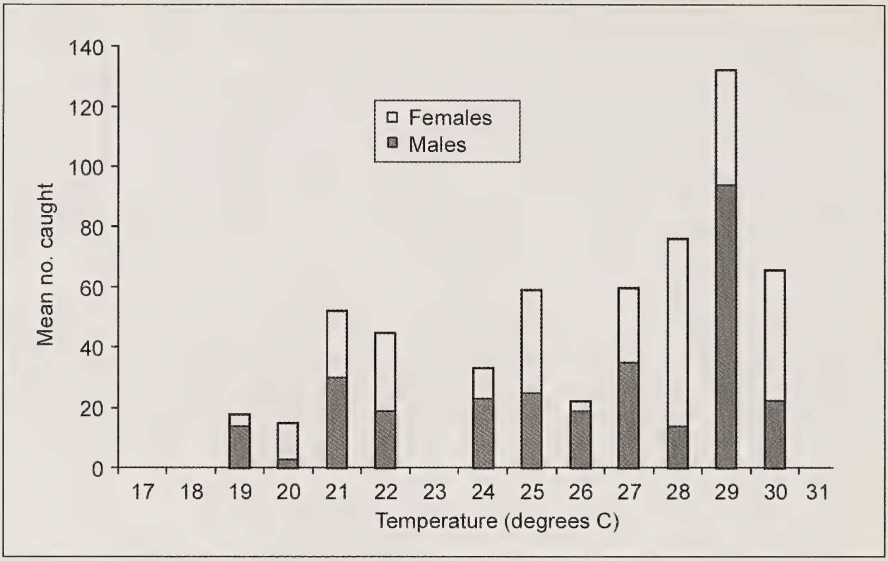

Figure 7. The relationship between catch rate and temperature for *Hesperia comma*.

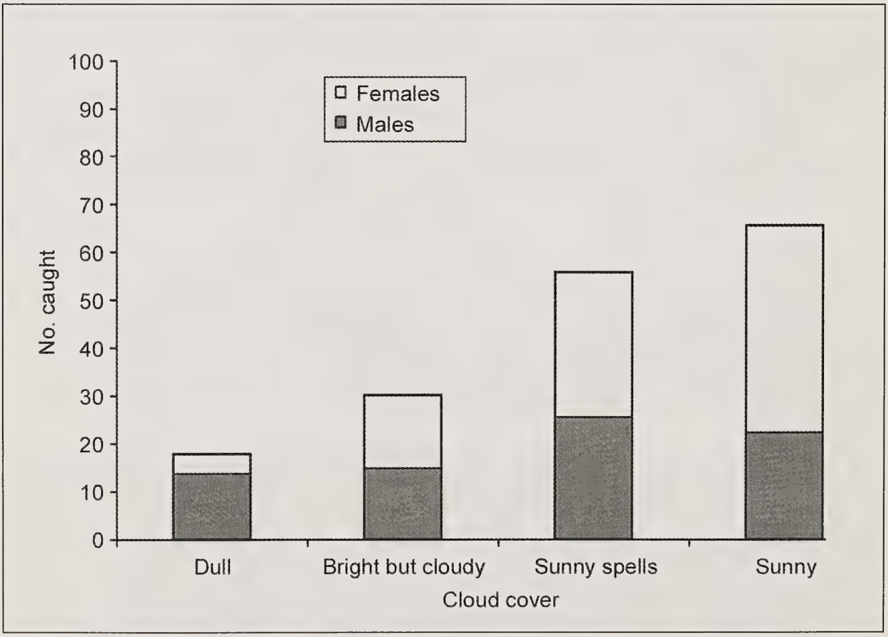

Figure 8. The effect of weather conditions on the catch rate of *Hesperia comma*.

Table 3. Potential barriers to butterfly movement between areas at Aston Rowant NNR 2001

From/ to site	Approximate distance (m)	Potential barriers with the minimum distance between suitable habitats
A to B	550	Improved grassland, motorway plus cutting and a north-facing slope comprising primarily scrub.
B to C	600	Improved grassland, a north-facing slope, woodland and a track with scrub.
C to A	1150	Barriers include scrub, woodland, track, improved grassland. Motorway and cutting, and a north-facing slope (as above).

species. Unfortunately there are no data on levels of dispersal of *L. coridon* between these areas prior to the construction of the motorway, but it is suggested that it is reasonable to assume that their frequency and extent have been reduced since its construction. Further studies may be required in order to show that these populations remain interconnected today. It appears that *L. coridon* is more mobile than *H. comma* and may therefore be less open to non-random extinctions (Thomas, 2000).

No migration of *H. comma* was observed between any of the three study areas. This strongly indicated that there were significant barriers to the dispersal of this species within the Aston Rowant nature reserve. A habitat assessment undertaken in advance of this study indicated that this follows the generally accepted definition of a barrier for this species as being a continuous belt of woodland or scrub, or 25m of unsuitable habitat (Thomas & Jones, 1993). Individuals of this species in the three study areas therefore exist as discrete populations. The distances required for inter-site movements in the current study are well in excess of that described above, although it should be noted that they were still within the longest recorded dispersal distance for *H. comma* of 1070m recorded by Hill, Thomas, & Lewis (1996). The findings of the current study indicate that this species as well as being a specialist in terms of habitat requirements (as shown by higher capture numbers on south facing slopes with short turf supporting a wide range of wild flowers), is also of low or intermediate mobility and is therefore more susceptible to local extinctions (Thomas, 2000).

The study was carried out over one complete breeding season for both species and the low level of observed inter-site dispersal indicated that the potential for genetic transfer between individuals at the three areas was limited. Field observations on those individuals that managed to migrate between areas indicated that these were often in a poor physical state and the viability of these individuals may therefore have been considerably reduced.

Various barriers to migration within the study area have already been discussed, however research on cross-movements associated with the M56 (Dennis, 1986) provides an indication that butterflies may not only be influenced by physical barriers but also as a result of skirmishes with con-specifics or other insects. In addition, while factors such as temperature, the degree of sunshine and rainfall were observed to influence the degree of activity and the catch rate associated with both species of butterfly, the only factor that appeared to influence dispersal was favourable prevailing winds. However, it was not within the capacity of this study to determine the exact day and therefore conditions under which inter-site movement took place and this would need to be the subject of further study.

The main issues associated with habitat fragmentation and the impacts of the M40 on these areas are:

(i) Populations are effectively isolated, leading to reduced gene flow, and eventually a reduction in the viability of the populations.
(ii) The potential for the study areas to serve as a source population for re-establishment or colonisation of surrounding areas is significantly reduced by habitat fragmentation both by past land-use management and by the presence of the M40.
(iii) Dispersal ability is not uniform between the two species and *L. coridon* was found to have a greater migration success between the study areas.
(iv) Other factors, particularly prevailing wind direction appear to play a role in dispersal.

From the results of the study it was concluded that the M40 was having a significant impact on habitat fragmentation and the following recommendations to try to mitigate these impacts were made to improve habitat connectivity:

- to consider examples of possible solutions used elsewhere, such as ‘green bridges’, to minimise habitat fragmentation issues; and
- make changes to the habitat management of the study area to reduce the amount of unfavourable habitat or significant barriers between areas of suitable habitat.

‘Green bridges’ are a relatively new concept in the UK, but have been used successfully in other parts of the world including Europe, the USA, Canada and South Africa (Reynolds, 1998). These structures serve to connect roadside or adjacent habitats and to effectively allow replacement of small sections lost through the road foot-print. In Europe retrofit green bridges have been installed over highways where habitat fragmentation has proved to be a significant barrier to wildlife (Reynolds, 1998). The majority of these have been developed primarily for the purpose of larger mammals and comprise a prefabricated concrete structure placed over a road and covered with sub-soil enabling the replication of habitats on either side of the road to be achieved through active habitat creation. These structures vary from 20 to 200m in width and are primarily aimed at resolving the barrier effect of roads on larger mammals (Reynolds, 1998). Currently, France has the most structures in place, but Germany and Switzerland also have many good examples. Research is currently being undertaken in Germany to monitor the benefits of a purpose-built structure to a variety of wildlife including birds, mammals and invertebrates (Georgi, 2001). Green bridges are relatively expensive solutions, but they do resolve many fragmentation problems (both ecological and social) and consequently are being considered as viable solution in many countries.

This approach is likely to be particularly appropriate in this case as the study site is a nutrient-poor chalk downland habitat. It is hoped that this case study will serve to provide justification for increased consideration of the impacts associated with habitat fragmentation in the UK.

The other issue highlighted by the study was the barrier effect created by ‘unsuitable habitat’ preventing dispersal of butterflies between patches. The easiest solution here would be to alter the management regime of the intervening habitats (particularly those that separate two suitable areas of short chalk downland) by removing sections of scrub and then applying a maintenance programme that encourages the development of the butterflies’ preferred habitats. This would effectively create channels that would permit both butterfly species to fly freely

between larger areas of suitable habitat creating larger, more stable meta-populations.

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SHORT COMMUNICATION

Records of *Patchiella reaumuri* (Kaltenbach) (Hemiptera: Pemphigidae) new to Wales – Many naturalists are familiar with the aphid *Eucallipterus tiliae* (L.) which is common on lime trees (*Tilia* sp.), feeding primarily on leaf undersides and excreting much honeydew. Less familiar, and the only other aphid known from *Tilia* in Britain, is *Patchiella reaumuri*, which feeds on *Tilia* in the spring, typically on leaves arising from 'epicormic' shoots that sprout low down on the trunk. The leaves often become curled and twisted into a 'nest' within which the aphids feed, sometimes attended by ants. All the second generation are winged and leave *Tilia* to feed on the subterranean parts of plants in the family Araceae in the summer, before returning to *Tilia* in the autumn to mate and lay eggs that form the over-wintering stage. Blackman & Eastop (1994) provide a key to identifying both *E. tiliae* and *P. reaumuri*. The fundatrix of *P. reaumuri* on *Tilia* is plump, globular and yellow-brown or greenish in colour.

According to Fauna Europaea, *P. reaumuri* is known from Austria, Bosnia and Herzegovina, Britain, Bulgaria, Croatia, Czech Republic, France, Germany, Italy, Moldova, Poland, Romania, Slovakia, Slovenia, Spain, Turkey and the 'Near East'. Blackman & Eastop (2000), report that the aphid is known from the roots of *Colocasia esculentum* (taro), in Hawaii and the Solomon Islands, and Vic Eastop (*pers. comm.*), reports the root feeding generations from continental USA, suggesting that a non host alternating form of *P. reaumuri* on roots of Araceae may be widespread. Roger Blackman and Vic Eastop (*pers. comm.*) report British records from Buckingham Palace gardens (winged specimens from a Malaise trap), from *Tilia* leaf nests in Cambridge, Coventry, Henley on Thames and Kent, and there are specimens in the British Museum of Natural History collection reared on *Arum* at Harpenden by Henry Stroyan. Mark Taylor (Rothamsted Research) reports a single winged specimen from a suction trap at Silwood Park on 26 June 2003. It is surprising that more suction trap records have not been made, but it is possible that *P. reaumuri* does not fly very high or far and may form non host alternating populations on roots of Araceae in Britain. Since 2007 the author has observed leaf nests with associated fundatrices and nymphs on the epicormic growth of three *Tilia* × *vulgaris* in Bath, and attendance by *Lasius niger* (L.) on one tree.

In May 2009 *P. reaumuri* was observed at two sites in Cardiff. A single fundatrix and nymph were observed on the leaf of a mature *Tilia* × *vulgaris* in the grounds of flats off New Zealand Road. The leaf arose from a branch in the lower crown and was not significantly distorted by feeding. Several fundatrices and their associated nymphs were observed on leaves arising from epicormic growth at the base of the trunk of a *Tilia* × *vulgaris* in the grounds of Nazareth House, Colum Road. The leaves were distorted into nests within which the aphids fed, hidden from view, protected from inclement weather and in some cases attended by *L. niger*.

The galls of the cecidomyiid, *Dasineura thomasiana* (Kieffer) are frequently found on the epicormic growth of *Tilia* and since they are in some cases similar in appearance to the leaf nests of *P. reaumuri*, can make the latter hard to spot. Nevertheless, casual observation suggests that *P. reaumuri* is rare on *Tilia* in Britain. Its status on Araceae is not known, but it may be common and overlooked. The author would welcome records of *P. reaumuri* from *Tilia* or Araceae and details of ant attendance. – EDWARD BAKER, 10 Bron Awelon, Barry, Vale of Glamorgan, CF62 6PR

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THE SWARMING BEHAVIOUR OF *EPISYRPHUS BALTEATUS* (DIPTERA: SYRPHIDAE) IN RELATION TO CONSPECIFIC COMPETITION

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ABSTRACT

Swarming is a common activity in the Diptera. Generally associated with mating, competition within swarms is fierce and in order to succeed, all approaching insects must be challenged. The majority of these challenges are unsuccessful, resulting in energy being spent on activities other than mating. Conspecific competition increases in line with swarm population and the associated increase in the cost of swarming is likely to affect the behaviour of individual flies within the swarm. Observations of the swarming behaviour of the most widespread and abundant British hoverfly, *Episyrphus balteatus* (De Geer), were undertaken in a 15 ha wood in western Northamptonshire (VC32) from July to September 2009. Two measures of swarm site scanning rate were devised: time between turns and total angle turned. In addition to recording basking, hovering and chasing behaviour, both measures were used to investigate the effects of conspecific competition on swarming behaviour. An increase in swarm population size brought about significant changes in behaviour. The rate at which the lek surroundings were scanned for approaching insects declined, with conspecific male chases and conspecific male-induced interruptions to basking periods both increasing. The additional conspecific competition led to an assumed rise in energy expenditure, more but shorter basking periods, a reduction in overall resting time, proportionally less overall time spent hovering and an assumed shorter stay at the lek.

INTRODUCTION

Swarming is a common activity in the Diptera and is generally associated with mating (Downes, 1969). There are two main modes of swarming: perching and hovering. Species that employ the perching mode aggregate on objects such as small trees and shrubs and intercept passing females (Alcock, 1983; Povoln & Verves, 1997; Alcock & Kemp, 2006). The hovering mode is more common in Diptera and has been observed in most families (Sullivan, 1981). In this type of swarming, which forms the subject of this paper, groups from one to a thousand or more flies (usually male) hold station, often with reference to a visual marker, and await the arrival of a receptive female (Thornhill, 1976; cf. Sullivan, 1981; Blackwell *et al.*, 1992; Svensson & Petersson, 1992; Gullan & Cranston, 2005). The behaviour of individual insects within such swarms can be separated into four distinct categories: basking, hovering, chasing and mating (Alderman, 2008). Any one of the first three categories can be observed taking place at any one time. Mating, however, is less often observed (Downes, 1969; Alcock, 1983; Gilbert, 1984). This has led some authors to suggest that male swarms may not always be related to mating (cf. Sullivan, 1981), although the lack of observed matings may be due more to observational methods than an actual absence (Corbet, 1964). A species whose swarming sites generally contain no

resources important to females (such as suitable oviposition sites), and in which males exhibit aggressive conspecific and heterospecific pursuit behaviour, is said to have a 'lek' mating system (Gullan & Cranston, 2005). In this paper, swarming sites are referred to as 'leks' (Heinrich & Pantle, 1975), without implying the presence of a dominance hierarchy.

With a low female-male ratio, competition for mating within swarms is fierce and increases in line with the swarm population. Both heterospecific and conspecific male chases are frequently observed (Povoln & Verves, 1997; Alderman, 2008) and are either mating attempts or territorial defence or both (Alcock, 1983; Alcock & Kemp, 2006). These activities are not without penalty and a correlation between the number of males present and the frequency of chases and a corresponding increase in the cost of swarming has been suggested (Alcock & Kemp, 2006). A hovering male will already be flying and will therefore have a greater chance of reaching a receptive female before a basking male (Heinrich & Pantle, 1975). Hovering is therefore often the dominant observed behaviour (Alderman, 2008). Hovering, like chasing, is also not without an energy penalty and males tend not to stay long at a lek (Heinrich & Pantle, 1975; Gilbert, 1984). Basking on the other hand is seen as a way of conserving energy and prolonging the stay at a lek (Heinrich & Pantle, 1975).

With the cost of swarming affecting competition for mating opportunities, the behaviour of males within a swarm should change in relation to the number of males forming that swarm. Nothing appears to have been published on this point. This paper describes a set of observations designed to investigate the effects of conspecific competition on the swarming behaviour of *Episyrphus balteatus* (De Geer) (Syrphidae).

Methods

Study Area

The study was undertaken in Delapre Woods (SP755582), a 15 ha mixed woodland located on the southern boundary of Northampton (VC32) (Fig. 1). The wood contains oak (*Quercus spp.*), sweet chestnut (*Castanea sativa*), sycamore (*Acer pseudoplatanus*), beech (*Fagus sp.*) and various conifers, together with significant amounts of standing and fallen deadwood.

Study Species

Episyrphus balteatus is one of the most widespread and abundant British hoverflies, found in the UK throughout the year, with the main season running from May through to September (Dean, 1982; Chambers *et al.*, 1986; Ball & Morris, 2000). Males commonly form aerial swarms in woodland clearings, where they are easily observed (Alderman, 2008), which coupled with the long flight period of the species makes *E. balteatus* an ideal subject for studying swarming behaviour.

Data collection and analysis

Scoping visits to Delapre Woods were undertaken in early July 2009 to confirm the presence of *E. balteatus* and the location of the leks. Further visits to carry out the behavioural observations were made at various times between approximately 0830h and 1900h, during July, August and into early September 2009. A Sanyo ICT-B29X digital voice recorder, which has an integral digital counter with a 1 second resolution, a digital stopwatch with 0.01 second resolution and a large-scale home-made 360° protractor were used to record swarming behaviour. The behaviour of *E. balteatus* was found to be modified by wind speeds above 0.4 m/s. Basking

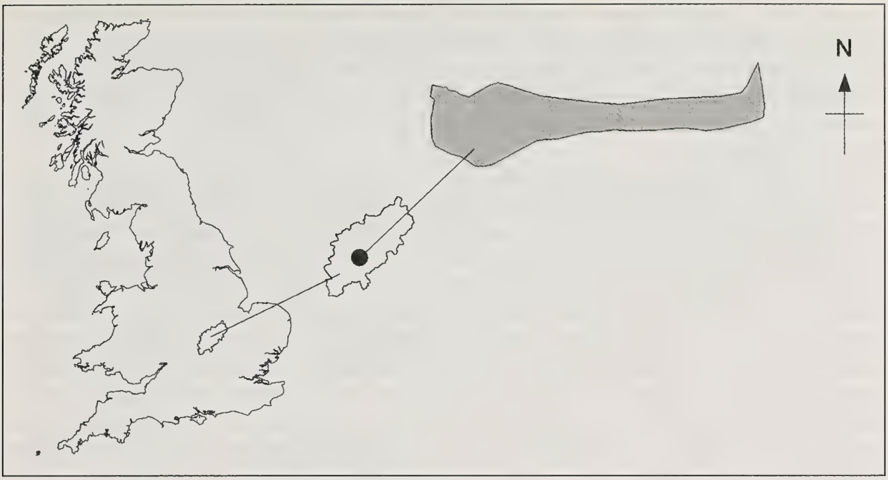

Fig. 1. The orientation of Delapre Woods and its location within VC32 and the UK.

commenced at an air temperature of 14°C, with hovering commencing at 16°C and continuing up to 24–25°C. Readings were therefore only taken when wind speed was below 0.4 m/s and air temperature was between 16–24°C. A Lutron LM-8000 environment meter was used to record wind speed and air temperature.

Prior to commencing observations, a pair of Pentax Papilio 8.5 × 21 close-focus binoculars, which focus down to 0.5 m, were used to confirm the identify of target flies without disturbing their behaviour.

The number of *E. balteatus* present in any one swarm varies over short periods of time (Alderman, 2008). Due to the difficulties in simultaneously counting swarm populations and making observations, the recorded data were assigned to one of two swarm types: those comprising one fly, referred to as 'single-swarms' and those comprising more than one fly, referred to as 'multiple-swarms'.

One issue with the methods used in this study is that of pseudoreplication. The leks were not independent and there was no way of knowing whether the same individual flies were being observed more than once (which almost certainly was the case). That said, many ecological data are pseudoreplicated in this way and it is an ongoing issue in observational studies. There is unfortunately no other way to conduct this kind of work in anything like a realistic time scale.

A trial analysis on the recorded data sets revealed they were not normally distributed and could not be satisfactorily normalised through transformation. Non-parametric statistical analyses were therefore performed on the recorded data, with all the presented test statistics (H, Z etc.) incorporating the appropriate correction factors for tied values. Due to the unavailability of a suitable commercial statistical package, software written by the author was used to automate the tests.

Lek-scanning measures

For swarming to be effective, insects must be oriented such that an approaching insect enters their field of view. They therefore need to be facing in at least the approximate direction from which approaching insects are likely to arrive at the lek. The length of time that a fly spends looking in the same direction governs both the

chance of spotting an insect approaching from that direction and the chance of missing insects approaching from other directions. If the arrival direction is not known, the flies will have to periodically change direction to scan the lek and its immediate surroundings as they search for approaching insects. The faster the lek surroundings are scanned, the greater will be the chance that an individual fly will spot a potential mate.

In order to investigate lek-scanning behaviour, two measures were devised: 'time between turns' and 'total angle turned'. 'Time between turns' measures the time that a fly spends looking at a particular section of the lek surroundings and is calculated by recording the total time in seconds between direction turns. 'Total angle turned' measures the areal extent of lek surroundings that a fly looks at and is calculated by measuring the maximum angular displacement in degrees made over a set period of time. Although they measure different aspects of swarming behaviour, both measures taken together provide an overall measure of the rate at which the lek surroundings are scanned and hence can be used to reflect the influences of conspecific competition. The methods by which both measures were employed to compare the behaviour of flies in single- and multiple-swarms is described in the following two sections.

i. 'Time between turns'

The 'time between turns' data were collected by visiting a lek, selecting a fly and using the digital voice recorder to record each time that a fly changed direction. Playing the recorded sequence back with reference to the integral counter enabled the measure to be calculated to the nearest second. To ensure that only valid times between turns were included, recording commenced on the first direction change after the fly started to hover. Recording was stopped when hovering ceased, either through the fly leaving the lek, starting a chase or basking. Recording was also stopped if the swarm changed type as a result of other flies leaving or joining the lek. After recording one fly, a different lek was visited and a further fly selected.

Whenever the lek was bathed in sunshine, both *E. balteatus* and approaching insects became far easier to see and also appeared to become more active. To isolate any effects that light intensity may have on behaviour, the single- and multiple-swarm recordings were further separated into those taken when the leks and their immediate surroundings were bathed in sunshine and when they were in shade.

To test for any significant influences that both swarm type and sunshine may have on the time that swarms spent looking looking in the same direction, a non-parametric Scheirer-Ray-Hare two-way analysis of variance using ranks was performed on the 'in sun' and 'in shade' data sets for both single- and multiple-swarms. (This test is an extension of the Kruskal-Wallis one-way analysis of variance using ranks.) To identify any significant differences, a Nemenyi *post hoc* multiple comparison test was performed between all four data sets.

ii. 'Total angle turned'

The 'total angle turned' data were collected by visited a lek, selecting a fly and using the large-scale protractor to measure the angular displacement between the selected fly's starting direction and the maximum deviation from that direction, over a period of 30 seconds Thirty seconds was found to be the longest uninterrupted hovering period over which flies could be recorded, commensurate with obtaining enough records to form a statistically valid dataset.

As with the 'time between turns' measure, after recording one fly, a different lek was visited and a further fly selected. To test for any significant differences between the total angular displacement made by flies in single- and multiple-swarms, a large sample two-tailed Mann-Whitney U test was performed on the recorded data.

Activity times

Two further measures of swarming behaviour are the frequency and duration spent undertaking the main lekking activities of basking, hovering, chasing and mating. Mating was not observed to take place at any of the leks and therefore did not play a direct part in this study. Chasing takes two forms: heterospecific and conspecific (Alderman, 2008). As only heterospecific chases occur within single-swarms, but both forms occur within multiple-swarms, chasing is of particular interest to this study. The author had already recorded a data set for multiple *E. balteatus* swarms for a previous study, which includes separate heterospecific and conspecific chase data (Alderman, 2008). If there is no difference between the behaviour of single- and multiple-swarms, there should be no significant differences between the frequency and duration that each swarm type spends undertaking the same activity. To test this hypothesis, the frequency and duration that flies in single-swarms spent hovering, chasing and basking was recorded, until the total time reached 8810 seconds, matching that made for the earlier multiple-swarm study (Alderman, 2008). To provide a definite starting point, recordings started at the first change of activity observed after selecting the fly, stopping when the fly either left the lek or the swarm changed type, as described for the 'time between turns' measure. After recording one fly, a different lek was visited and a further fly selected.

To test for any significant differences between the duration of each activity, large-sample two-tailed Mann-Whitney U tests were performed on the recorded times that flies in both swarm types spent basking and hovering. A Kruskal-Wallis one-way analysis of variance using ranks, followed by a Dunn's *post hoc* multiple comparison test were carried out to establish and further explore any significant differences between the three chase categories. A Chi-squared test for association was applied to the datasets to provide a comparison between the frequencies of each activity category for both swarm types.

RESULTS

'Time between turns'

A total of 2,000 recordings of *E. balteatus* were made for the 'time between turns' measure. These were split into 500 recordings with the leks bathed in sunshine and with the leks in shade, for both single- and multiple-swarms. To obtain these data, the behaviour of a total of 68 flies from 27 leks was recorded for single-swarms and 69 flies from 32 leks for multiple-swarms. Details of the dataset are provided in Table A1 of the Appendix.

There was a significant interaction between the behaviour of flies in single- and multiple-swarms and the presence or absence of sunshine (Scheirer-Ray-Hare; $H = 11.599$, $df = 1$; $P < 0.05$). From the Nemenyi *post hoc* multiple comparison, adults of *E. balteatus* in multiple-swarms spent a significantly longer time looking in the same direction than those in single-swarms. The presence or absence of sunshine had no significant influence on the time spent looking in the same direction on either swarm type (Minimum Significant Difference $= 94$; $P < 0.05$) (Fig. 2).

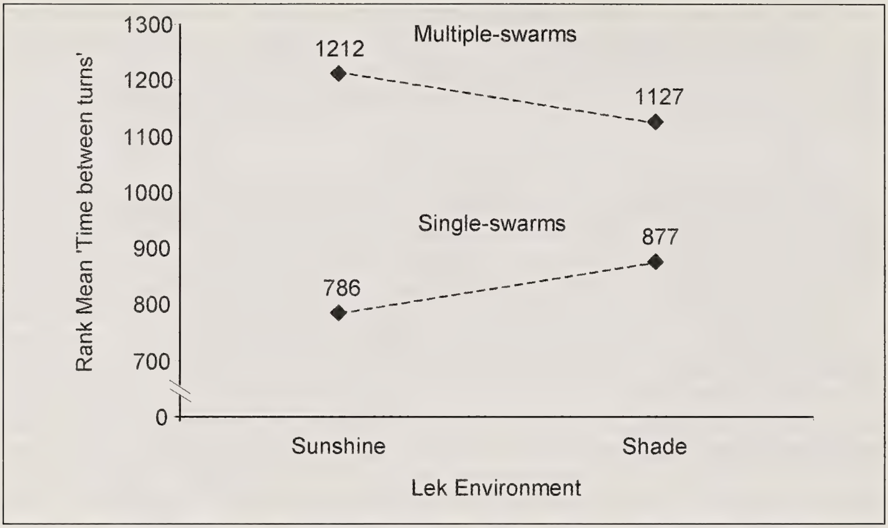

Fig. 2. Rank means of the 'time between turns' dataset, showing the interaction of swarm type, sunshine and shade on the time that *Episyrphus balteatus* swarms spent looking in the same direction. The dashed lines link the statistically similar results at $P>0.05$.

'Total angle turned'

A total of 100 recordings was made for the 'total angle turned' measure, by selecting 50 flies from single-swarms in 22 leks and 50 flies from multiple-swarms in 18 leks. Details of the dataset are provided in Table A2 of the Appendix. There was no significant difference between the maximum angular displacement made over a 30 second period for flies in either single- or multiple-swarms (Mann-Whitney U; $Z = -0.8582$; $P>0.05$).

Activity times

The single- and multiple-swarm activity time datasets were compiled from the behaviour of 94 flies from 16 leks for the single-swarm data and from the existing multiple-swarm data collected by Alderman (2008). Details of the dataset are given in Table A3 together with observed and expected activity frequencies in Table A4 of the Appendix. Flies in single-swarms spent significantly less time on bouts of basking than flies in multiple swarms (Mann-Whitney U; $Z = -2.5537$; $P<0.05$) (Fig. 3). Flies in single-swarms undertook significantly fewer bouts of basking than expected, whilst flies in multiple-swarms undertook significantly more than expected (Fig. 4). Flies in single swarms spent proportionally more of their time on bouts of hovering than flies in multiple swarms (Fig. 3), but the difference was not significant (Mann-Whitney U; $Z = -0.3372$; $P>0.05$). Flies in single-swarms undertook slightly more bouts of hovering than expected, whilst flies in multiple-swarms undertook slightly fewer than expected (Fig. 4).

Heterospecific chases occurred in both swarm types, but conspecific chases only occurred in multiple-swarms. All conspecific chases involved males; no females were observed at any of the leks. Flies in both swarm types spent a similar proportion of

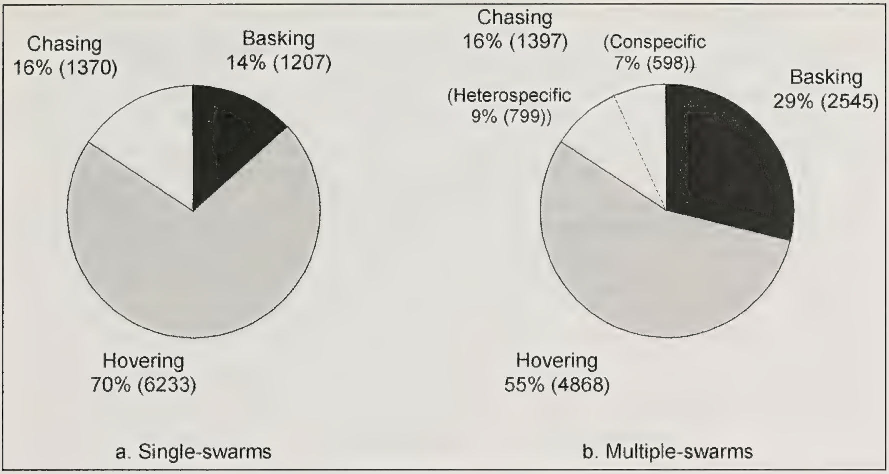

Fig. 3. The percentages (and actual times in seconds) of the total observation period that each *Episyrphus balteatus* swarm type spent undertaking each main type of activity. The multiple-swarm chase time has been split into its contributory heterospecific and conspecific parts.

their total activity times undertaking chases (Fig. 3). There was, however, a significant difference between the times that flies in single- and flies in multiple-swarms spent undertaking the different chase categories (Kruskal-Wallis; $H = 64.39$; $df = 2$; $P < 0.05$). Using a Dunn's *post hoc* multiple comparison test, heterospecific chases for both swarm types lasted for a similar amount of time, but the conspecific chases undertaken by flies in multiple-swarms lasted significantly longer than the heterospecific chases undertaken by either swarm type (Fig. 5 and Table 1). Flies in single-swarms undertook slightly more bouts of chasing than expected, whilst flies in multiple-swarms undertook slightly fewer than expected (Fig. 4).

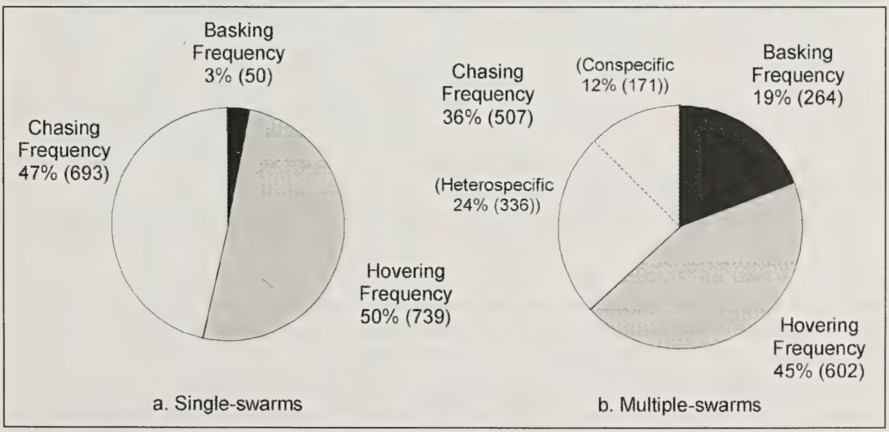

Fig. 4. The frequency that each *Episyrphus balteatus* swarm type spent undertaking each main behavioural activity, expressed as a percentage of the total number of recorded observations. The actual frequencies are bracketed. The multiple-swarm chase frequency has been split into its contributory heterospecific and conspecific parts. This figure is based on Tables A3 and A4.

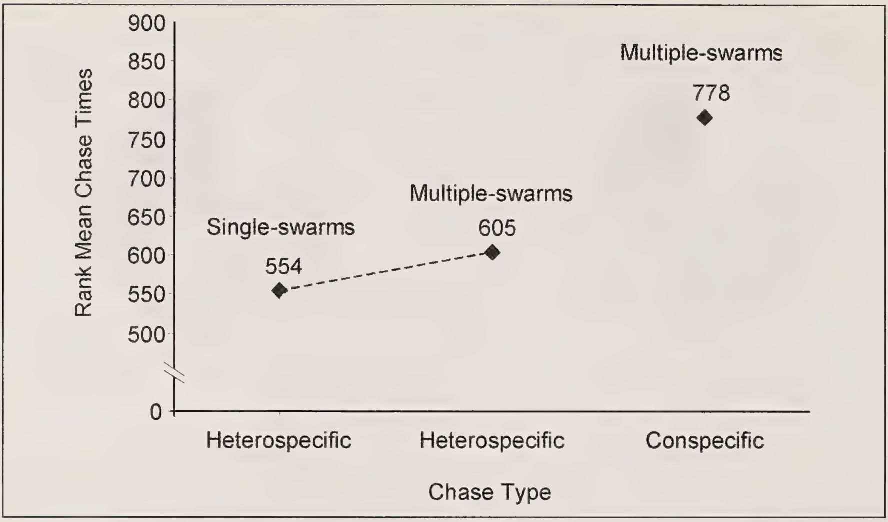

Fig. 5. Rank means of the *Episyrphus balteatus* chase activity dataset showing the interaction of chase and swarm types. The statistically similar linked results lie within the appropriate Dunn's *post hoc* multiple comparison test Minimum Significant Differences (MSD) given in Table 1.

Discussion

Episyrphus balteatus appears to prefer lower temperatures. Above 25°C, *E. balteatus* was not seen at ground level, whereas other species, such as *Syrphus ribeseii* (L.) (Syrphidae) and various fanniid flies, were still swarming. It may be that as ground level air temperature rises, *E. balteatus* swarms move up towards the canopy to keep below their upper temperature limit, but as the author's tree climbing days are but a distant memory this was not possible to determine. Whilst air temperature effectively governed hovering activities, light intensity at the lek and its immediate surroundings was not found to be a significant factor in the swarming behaviour of *E. balteatus* (Fig. 2). The lack of dependence on light intensity enabled *E. balteatus* to swarm from early in the morning until at least dusk, as long as the air temperature remained within range. Similar effects have been noted for other swarming Diptera, such as the *Anarete* species (Cecidomyiidae) studied by Chiang & Stenroos (1963), in which air temperature did more to encourage swarming than either the time of day or light intensity.

The swarms of some species orient in a particular direction, such as the tendency for *Fannia armata* (Meigen) (Fanniidae) to align in a direction relative to the bearing

Table 1. Results of the Dunn's *post hoc* multiple comparison test carried out on the *Episyrphus balteatus* chase activity dataset. The figures in the cells give the rank mean differences and the Minimum Significant Differences (MSD) between samples at P<0.05.

	Multiple con. (m = 778)	Multiple het. (m = 605)
Multiple het. (m = 605)	172 (MSD = 78) *	–
Single het. (m = 554)	223 (MSD = 71) *	51 (MSD = 55)

m = sample rank mean * = significantly different combinations (greater than the MSD)

of the sun (Alderman, 2009). This was not the case for *E. balteatus*, in which swarms were constantly changing direction, eventually turning through 360°. Swarm members hovered above the same spot, changing direction in unison, such that at any one time all flies were facing in the same direction. After turning through 180°, flies starting at the front of the swarm therefore ended up at the rear.

The mechanism behind *E. balteatus* direction changes is yet to be determined, but as multiple-swarms spent significantly more time looking in the same direction than single-swarms (Fig. 2), the presence of conspecific males must therefore act in some way as a constraint on direction changes. This was further evidenced by observations that flies joining multiple-swarms often started hovering at 180° to the main hovering direction, but almost immediately changed direction to match that of the swarm. Although there was no significant difference between the maximum angular displacement for either swarm type, four of the recorded flies in single-swarms turned 360° in 30 seconds whereas the maximum displacement for flies in multiple-swarms was 190° (Table A2). This suggests that single-swarms tend to turn through a larger angle in a given time, although a larger sample size would be needed for confirmation.

Single *E. balteatus* often formed a swarm with one or more *S. ribeseii*. Within such swarms, both species were seen to change direction at the same time, with *E. balteatus* undertaking conspecific chases with *S. ribeseii*. In these cases, the swarming behaviour of *E. balteatus* was being constrained by the presence of males of a different species.

The conspecific constraint on direction changes and possibly angular displacement may be a form of competitive behaviour, with flies not 'wanting to miss out' on what neighbouring flies in the swarm appear to be looking at. The faster the lek surroundings are scanned, the greater will be the chance that an individual fly will spot a potential mate. With a greater rate of turn and an assumed greater angular displacement, flies in single-swarms should have an increased chance of noticing approaching insects, any one of which could present a mating opportunity. These findings suggest that the mating probability of an individual fly decreases as the swarm population increases. This is in addition to the decrease in individual mating probability arising naturally from the increase in male/female ratio. The fact that *E. balteatus* swarms eventually turn through 360° suggests that the female approach direction is probably not known. From the species' perspective, this may not be a problem as once a female reaches the swarm they will eventually be noticed and a mating will ensue anyway. Should this happen, the advantage of being in a less populous swarm will of course be lost.

Within *E. balteatus* swarms, basking and hovering both take place before chasing, which itself is the immediate precursor to a mating attempt (Alderman, 2008). The probability of a mating will be inversely related to the duration of a chase. It can therefore be assumed that in order to reduce the time to reach a potential mate, swarming males will spend proportionally more time hovering than basking (Heinrich & Pantle, 1975). This was indeed found to be the case for *E. balteatus* (Fig. 3). As mating competition is a matter for the individual fly, it may also be assumed that the behaviour of flies would remain unaffected by the number of flies in the swarm, but this was not found to be the case. As swarm population decreased, the duration and frequency of hovering increased slightly, whilst the total basking duration decreased significantly, with basking periods themselves lasting longer but occurring less often (Figs. 3 and 4). Hovering is an energy-consuming activity and as male flies generally do not feed at leks, basking is undertaken as a method of energy conservation in order to prolong their stay (Heinrich & Pantle, 1975; Gilbert, 1984). In

taking longer basking periods, flies in less populous swarms were therefore likely to be better rested and could hover for a greater proportion of the time (Fig. 3). The increased number of basking periods undertaken by flies in more populous swarms suggests they were trying to rest, but something was preventing them doing so (Fig. 4).

With mating itself not being observed during this study, the cause of the changes in hovering and basking behaviour in relation to swarm population could only be due to chasing activities. Although flies in both swarm types spent a similar proportion of their total time at the lek undertaking chases (Fig. 3), there were differences in chasing activities between swarm types. Approaching insects initiated short chases to within approximately 150 mm. If the intruder was heterospecific, usually smaller flies, then the chase was abandoned and hovering immediately resumed. All flies undertook such behaviour and the duration of heterospecific chases was independent of swarm population (Figs 3 & 5). If a nearby hovering male became too close, then a much longer inter-twined spiralling chase ensued. As a result, conspecific chases lasted significantly longer than heterospecific chases (Fig. 5 & Table 1). The same type of inter-twined long-duration chases were also initiated by the occasional conspecific male joining the swarm. Such activities are presumably a result of mistaken gender identification, but could be a form of territorial behaviour (Pajunen, 1980). Regardless of the cause, with no mating taking place and the fact that both flies returned to the swarm and no territoriality was observed, conspecific male chases are considered unproductive energy-consuming activities from the mating point of view. As the swarm population increased, the overall number of chases declined (Fig. 4), but the number of conspecific male chases increased. Not only does this lead to an increase in male-induced 'unproductive' energy consumption, but also a decrease in the time available for mating.

The shorter basking periods undertaken by flies in multiple-swarms (Fig. 4) were caused by a further type of conspecific chase, or at least an example of conspecific influenced behaviour, in which conspecific males passing close to the swarm marker stimulated basking flies to start hovering. As there was usually no chase as such and basking often resumed shortly afterwards, this was taken as a further example of energy consumption through activities other than mating. Similar conspecific male induced chases have been observed in flies which employ the perching mode of swarming (Povoln & Verves, 1997). As swarm populations increase, the resulting shorter resting periods would result in more energy being expended within a given time. This in turn is likely to result in less time being spent at the lek, with a corresponding reduction in the probability of mating for the individual fly. With the flies having a limited amount of energy (Gilbert, 1984) and no method of increasing their supply at the lek, conspecific male-induced energy consumption is likely to result in less overall time spent hovering. This was found to be the case (Fig. 3) and would be another element in the reduction in mating probability for an individual fly.

In order for individual flies to have a reasonable chance of mating, a self regulatory mechanism which governs the maximum size of a swarm population probably exists. Both the fluctuating populations of *E. balteatus* swarms and the maximum observed population size of approximately 20 males noted by Alderman (2008) may be evidence for this mechanism, possibly brought about through the effects of conspecific competition.

Conclusions

There were measurable differences between the behaviour of *E. balteatus* swarms with one member and those with more than one member. An increase in swarm

population reduced the rate at which the lek surroundings were scanned for approaching insects, an increase in conspecific male chases and a corresponding increase in conspecific male induced interruptions to basking periods. In turn, these changes led to an assumed rise in energy expenditure, more but shorter basking periods, a reduction in overall resting time, proportionally less overall time spent hovering and an assumed shorter stay at the lek. Apart from the natural decrease in mating probability bought about by an increase in the male/female ratio, these results suggest additional ways in which an increase in swarm population may be detrimental to the mating success of individual male *E. balteatus*.

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Appendix

Table A1. A description of the *Episyrphus balteatus* 'time between turns' dataset. The last two columns describe the combined single- and multiple-swarm data respectively, which consisted of all 'in sun' and all 'in shade' data for the respective swarm types. All cell values are in seconds.

	Single in sun (500)	Single in shade (500)	Multiple in sun (500)	Multiple in shade (500)	Single combined (1000)	Multiple combined (1000)
Minimum	0.33	0.24	0.65	0.35	0.24	0.35
Quartile 1	0.99	1.11	1.91	1.62	1.02	1.82
Median	1.57	1.98	3.04	2.72	1.77	2.88
Quartile 2	3.21	3.42	5.17	4.94	3.29	5.12
Maximum	15.7	15.15	66	26.2	15.7	66

Table A2. A description of the *Episyrphus balteatus* 'total angle turned' dataset. All cell values are in degrees.

	Single-swarms (50)	Multiple-swarms (0)
Minimum	20	20
Quartile 1	41	42
Median	70	70
Quartile 3	137	90
Maximum	360	190

Table A3. A description of the *Episyrphus balteatus* activity dataset. All cell values are in seconds. The italicised multiple-swarm chase times are the conspecific and heterospecific components of the total chase multiple-swarm dataset. Multiple-swarm data from Alderman (2008).

	Single-swarms (1482)			Multiple-swarms (1373)				
	Bask (50)	Hover (739)	Chase (693)	Bask (264)	Hover (602)	*Con Chase (171)*	*Het. Chase (336)*	Total Chase (507)
Min.	1	1	1	0.5	0.5	*0.5*	*0.5*	0.5
Q1	5	2	1	7	5	*2*	*1*	2
Median	9	5	2	7	5	*2*	*2*	2
Q3	21	11	2	14	11	*4*	*3*	3
Max.	240	143	16	59	67	*19*	*28*	28

Brackets in Tables A1–A3 denote number of observations.

Table A4. Results of the Chi-squared test for association on the *Episyrphus balteatus* activity dataset. All 'Obs.' and 'Exptd.' cell values are the observed and expected frequencies of each activity. The multiple-swarm figures are taken from Alderman (2008).

	Basking			Hovering			Chasing		
	Obs.	Exptd.	χ^2	Obs.	Exptd.	χ^2	Obs.	Exptd.	χ^2
Single	50	163	78	739	696	3	693	623	8
Multiple	264	151	84	602	644	3	507	577	8

Test statistic = 184 (significant; df = 2; $P < 0.05$).

PLATE 1

1: *Oecetis notata*, male, collected Field Studies Centre, Preston Montford, Shropshire, 21.vii.2008. Forewing length 8 mm. 2: *Ylodes simulans*, male, collected River Dee, Ty Nant, Wales, 24.vii.2008. Forewing length 6 mm. 3: *Ceraclea albimacula*, male, collected River Teifi, Dolaugwyrddon isaf, near Lampeter, Wales, 15.vii.2008. Forewing length 11 mm.

PLATE 2

1: *Hydropsyche instabilis*, male, collected River Teifi, Dolaugwyrddon isaf, near Lampeter, Ceredigion/ Carmarthenshire border, Wales, 15.vii.2008. Forewing length 11 mm. 2: *Hydropsyche siltalai*, male, collected River Usk, Crickhowell, Powys, Wales, 14.vii.2008. Forewing length 11 mm. 3: *Hydropsyche siltalai*, male, collected River Severn, Llandinam Gravels, Neuaddllwyd, Wales, 16.vii.2008. Forewing length 11 mm.

PLATE 3
1: *Oligotricha striata*, male, collected Whixall Moss, Shropshire/Wales border, 18.vii.2008. Forewing length 12 mm. 2: *Trichostegia minor*, male, collected Wem Moss, near Northwood, Shropshire, 18.vii.2008. Forewing length 9 mm. 3: *Limnephilus luridus*, female, collected Wem Moss, near Northwood, Shropshire, 18.vii.2008. Forewing length 12 mm.

PLATE 4

1: Female *Myrmosa atra*. Photo: J. Early. 2: Male *Myrmosa atra*. Photo: M. Edwards. 3: Third instar nymph of *Issus coleoptratus*. Photo: John Jeffery. 4: The hemerobiid lacewing *Drepanepteryx phalaenoides*. Photo: John Badmin. 5: Picture-winged fly *Myopites eximius*, Newtown harbour, Isle of Wight, 2009. Photo: Jonty Denton. 6: *Hyalopsocus morio* from Gloucestershire, 2009. Length 2.8–3.0 mm. Photo: Brian Valentine.

MATING BEHAVIOUR OF *MYRMOSA ATRA* (HYMENOPTERA: MUTILLIDAE) WITH A CONSIDERATION OF THE ADAPTIVE SIGNIFICANCE OF LONG COPULATION DURATION

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Abstract

Myrmosa atra (Panzer) males are winged; the females are wingless; the larvae are parasitic on subterranean nesting bees and wasps. One full and two partial copulations of *M. atra* were observed in the field. Copulation duration in this small wasp is lengthy. The female adopts an unusual position during copulation, coiled underneath the tip of the male's gaster. The male rhythmically taps the female with his back legs during copulation. The male is able to fly with the female attached to his genitalia and curled motionless under the tip of his gaster. This behaviour is discussed within a framework of current sexual selection theory. Phoretic copulation could serve to disperse the flightless female to new aggregations of her host.

Introduction

Myrmosa atra Panzer (Hymenoptera: Mutillidae) is a small wasp displaying extreme sexual dimorphism. *Myrmosa atra* is placed in the family Mutillidae and subfamily Myrmosinae (Gauld & Bolton, 1996). The position of the Myrmosinae (placed within the Mutillidae after Brothers, 1975) and the relationship of the Mutillidae to other families within the aculeate Hymenoptera are under active investigation (Pilgrim *et al.*, 2008).

Females (Plate 4, Fig. 1) are apterous, red and black with a long neck and depressed thorax. The ocelli are significantly reduced. She has stiff dark setae on her head, and particularly on the labium and mandibles. The gaster has several hair bands on the last three segments that range in colour from golden to dark brown. The final segments also possess a number of stiff setae along the sides of the gaster. The male (Plate 4, Fig. 2) is considerably larger than the female with well developed ocelli, thorax and toothed mandibles. He is winged, black, with a heavily pitted integument clothed in silvery hair. He possesses a shorter neck than the female. Identification keys are provided by Richards (1980) and Yeo & Corbet (1995).

Myrmosa atra is a parasitoid of ground nesting aculeates whose offspring feed on the developing host larva or pupa rather than the food stores (Archer & Roberts, 1998).

The usual position of male aculeate genitalia is orthandry i.e. where the dorsal part of the genitalia is face upwards. Copulation is achieved when the male mounts the female venter to dorsum and coils the tip of his abdomen downwards to make contact with the female genitalia. At this point the dorsal part of the male genitalia is facing the substrate. Males of basal Hymenoptera families (i.e. within the Symphyta) often possess genitalia in the strophandrous position, with the dorsal part of the genitalia facing the substrate. Copulation is achieved when the male backs into the female and the tip of his abdomen makes contact with the female genitalia in an end-to-end position. Within the Symphyta, families show both obligate and facultative strophandry (Schulmeister, 2001).

Methods

Observations were made at Harden Moor (SE0738) near Keighley, West Yorkshire. Within this area, the study site was a section of sandy footpath in full sun, some 15 m × 1 m within an area of rough grassland scrub (SE069385) containing a large aggregation of the subterranean nesting wasp, *Lindenius albilabris* (Fabr.), a suggested host of *M. atra* (Blösch, 2000). Mate locating behaviour was observed and recorded in a notebook and on a hand held tape recorder. Detailed study of the elements of copulatory behaviour at a close-focus distance were made using a Minox MS 8 × 25 Macroscope. Voucher specimens were taken.

Results

Male *M. atra* were frequently seen on hogweed flowers and less so on creeping thistles where they were seen to pounce on male and female *L. albilabris* also visiting the flowers for nectar. Males flew along the path inspecting the entrance holes of *L. albilabris* and sometimes entering them briefly. *Lindenius albilabris* females were provisioning their cells with heteropteran nymphs. Male *M. atra* were also seen pouncing briefly on *L. albilabris* females as they returned to their burrows and the ants *Formica lemani* Bondroit and *Myrmica ruginodis* Nylander seen running on the path. As soon as a male *M. atra* had made contact with a mistaken insect it took flight again and this developed into a low bouncing flight between 10 and 20 cms above the ground. This flight was very characteristic of the mate locating behaviour of *M. atra*.

On the 19 July 2007 at 0930h a pair of *M. atra* was observed *in copula* on the path within the nesting area of *L. albilabris*. The weather was warm and sunny. The female was curled up under the tip of the male's gaster and gave the appearance of a small red ball. She was motionless whilst the male vigorously tapped her with his back legs. The pair remained in this position for nine minutes, after which the male flew off with the female attached only by the genitalia, and apparently still in the curled position.

On 26 July 2008 at 1000h a female *M. atra* emerged from a *L. albilabris* burrow and ran along the path. A male immediately pounced on her and remained in contact. The male grasped the female around her neck with his mandibles. The tip of his abdomen prodded the tip of the females. Intromission was achieved but not observed. The female coiled into a ball and remained in this position held under the apical sternite of the male. The female held her antennae close to her sternum which became hidden by her legs which were also drawn close to her body with slight twitches. Her mandibles were relaxed and held slightly open. The female was slightly twisted to the left side of the male. The vertex of her head was close to the last sternite of the male. The male continually and rhythmically tapped the female with his back legs, particularly on her head. He also tapped the female on the hair bands of her gaster and brushed his back legs against the stiff setae on the sides of her gaster. After 39 minutes the female became restless, uncoiled and assumed an end to end position with the male. The male continued to tap the female. The female then curled up once more and assumed her previously coiled, almost motionless position. The pair remained like this for a further eight minutes. The copulation lasted for a total of 47 minutes and 26 seconds before separation. Prior to separation the female used her mandibles to bite the tip of the male's gaster and then uncurled herself assuming the end to end position. After separation the female hid herself within nearby grass tussocks. The male groomed himself for several minutes after

separation and was taken by the author as a voucher specimen. On examination with a stereomicroscope it was found that the genitalia were in the normal orthandrous position.

At approximately 1145h on the same day a second pair was noticed *in copula* a short distance from the previous observation. Again the female was noted to be curled into a ball under the tip of the male's gaster. It was not known if this pair had been there for some time, had just commenced copulation, or had flown in shortly before. On approaching the pair for closer observation with the macroscope, the male took flight, again with the female still attached in the same position.

Discussion

Strong sexual dimorphism is common in the Hymenoptera (Stubblefield & Seger, 1994). The different ecological conditions under which each sex survives can, under natural selection, lead to the evolution of radically different body plans and behaviours. Female *M. atra* spend their lives scurrying in and out of aculeate burrows searching for potential hosts. In these conditions wings would be a hindrance and aptery would be selected. Apterous morphs of normally winged insect species are known to have reduced ocelli (Dudley, 2000). It is thought that the ocelli play a part in 'horizon detectors' in order to control roll and pitch whilst in flight (Gullan & Cranston, 2000). A depressed thorax and short spiny legs seen in female *M. atra* should assist them in running along the ground and entering potential nest sites of their hosts. Female life history revolves around searching for resources that can become food for their offspring, whilst males spend their lives searching for females. This has a large effect on male and female body plans, with natural rather than sexual selection the driver for sexual dimorphism.

Long copulation in insects is generally associated with polygyny (Simmons, 2001). Copulation may be prolonged in polygynous species to facilitate sperm competition by positioning sperm within the female to optimise its utilisation, flushing out or removing sperm from previous males or as a form of mate guarding, preventing other males from mating. Within the Mutillidae, monandry is considered the norm. In monandrous species, a short copulation coupled with intense competition between the males to be the first and only one to mate with any given female is expected. This paper, however, provides evidence that the long copulation duration in *M. atra* facilitates phoretic copulation. This can disperse the females to new nesting aggregations of their hosts and possibly enable the female to reach flowers for nectar. Males were recorded flying with attached females. The host at Harden Moor was probably *L. albilabris* and this nested in several aggregations at a distance impossible for *M. atra* to travel without flight. Male *M. atra* would be able to transport flightless females to new aggregations of their host. Lelej & Nemkov (1997) state that within the Mutillinae, the subfamilies with more derived characters that diverge considerably (Dasylabrinae and Sphaeropthalminae), have shorter copulation times. They maintain that the tendency within the Mutillinae is towards reduced copulation duration. Unfortunately they do not state whether species in these groups exhibit phoretic copulation.

The well developed mandibles of the male (Fig. 1) and the corresponding elongated cervix of the female would facilitate the initial male grasping of the female. Sheldon (1970) reports sexual dimorphism in the head structure of mutillids in the genus *Timulla* particularly in the development of the male's mandibles and clypeus. This, he argues, relates to the phoretic copulation seen in this genus where the female

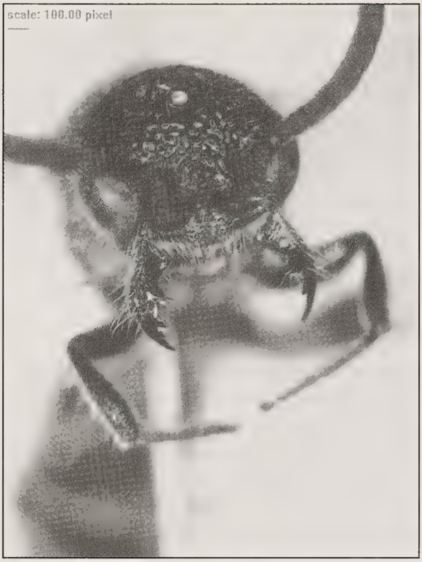

Fig. 1. Male *Myrmosa atra* head showing well developed mandibles. Photo: S. Saxton.

Fig. 2. Male *Myrmosa atra*. Top: terminal gastral sternite with spiculum. Bottom: genitalia. Photo: S. Saxton.

is held in the mandibles of the male. The development of these structures would be driven by sexual selection and are considered to be secondary sexual characteristics.

Stiff bristles on the sides of the female's gaster and head could detect the rhythmical tapping performed by the male with his back legs. Males were recorded tapping females with their legs during copulation. The male continued to tap the female in a rhythmical manner after she had uncoiled herself temporarily, before she assumed the coiled position once more. The curled female was quiescent during this phase. The male's tapping behaviour could not be considered to be restraint or antagonism. The most likely explanation of this behaviour is copulatory courtship (Eberhard, 1994).

The position of the male's genitalia within the female during copulation remains intriguing. From the position of the curled female (basically venter to venter) during copulation to the position of the pair preceding separation (end to end) it is judged that the genitalia had rotated 180° to a facultative strophandrous position. Strophandry is the norm in the basal Hymenoptera where end to end mating is recorded (Schulmeister, 2001). Within the Aculeata, copulation is normally achieved by the male curling the tip of his abdomen downwards so that during intromission the dorsal part of the genitalia face the substrate. Evans (1969) discovered a rotation of the male's genitalia in the tiphiid subfamily Thynninae which he presumed was accomplished by the female rotating 180° after intromission, the male's genitalia rotating on the basal membrane. He also considers the possibility that the males may suffer damage to the gentialia on decoupling, perhaps leading to death, but wondered why all the museum specimens of male Thynninae had apparently normal genitalia. The one male in this study seen to separate from the female, had genitalia in the normal orthandrous position, apparently undamaged. Osten (1999) produces

photographs of specimens of the tiphiid *Telephoromya rhombica* (Bréthes) collected in copula showing differing copulation positions.

In male *M. atra* the large bulbous gonostipes may assist anchorage to the female and provide insertion points for the musculature (Fig. 2). There are dense brushes of stiff setae on the harpes (=parameres) and also on the central spiculum of the extremely elaborate apical sternite. These brushes may stimulate the female during copulation and/or assist anchorage to the female. These possibilities are not mutually exclusive. Eberhard (2004) provided evidence that setae brushes on the "parameres/gonostyli" (=harpes in this study, after Schulmeister, 2001) in male tiphiid *Aelurus septentrionalis* Kimsey may function as devices to stimulate the female. This species also practices phoretic copulation. The functional morphology of the male's genitalia within the female during copulation remains unknown. The relationship of the Myrmosinae/Mutillidae to the basal Hymenoptera suggests studies of the functional morphology of Myrmosinae genitalia would be fruitful. Information on the position of male genitalia, whether copulating or not; and the copulation position adopted by species of the basal aculeate Hymenoptera, whether practising phoretic copulation or not would also be helpful.

Evans (1969) discusses phoretic copulation in the Bethylidae, Tiphiidae and Mutillidae and discovered copulation durations of up to one hour. In the Bethylidae he discovered males with long flagellar-like aedeagi. The females possessed a corresponding "aedeagal clasp" or "penis clasp" originating from the sting sheath, which acts to hold the aedeagus firmly in place. He notes with interest that the three genera of the Bethylidae that have males with highly complex "aedoeagi", namely the *Pristocera*, *Dissomphalus* and the *Apenesia* are the genera in which phoretic copulation has been reported. Within the Hymenoptera, the mechanisms used to achieve phoretic copulatory attachment differ widely, suggesting this phenomenon has evolved several times.

Sexual conflict theory proposes that the reproductive aims of males and females differ and each sex evolves morphological structures and behavioural traits as a result of this conflict. (Arnqvist, & Rowe, 2005). To prove that sexual conflict has driven the production of a sexually selected structure or behaviour it is necessary to demonstrate adaptations in the opposite sex that counter the structure or behaviour studied and therefore contribute to an "arms race" developing. In this study of *M. atra*, sexual conflict theory fails to explain the copulation position of the mating pair, the long copulation duration and male stimulation of the female during copulation. Evidence provided in this paper from observation of the copulation of *M. atra* and a comparison with studies of species in the Bethylidae, Tiphiidae and Mutillidae that practice phoretic copulation, suggest the tripartite mechanism of female control, female cryptic choice and copulatory courtship are more relevant explanations of the behaviours observed.

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ANNOUNCEMENT

National Insect Week 2010

The Royal Entomological Society's National Insect Week, with the theme 'Discover Diversity in the world of Insects' will take place during the week 21–27th June 2010. For details of events and lectures across the UK, visit www.nationalinsectweek.co.uk to find out more.

OVERWINTERING BIOLOGY OF NYMPHS OF *ISSUS COLEOPTRATUS* (HEMIPTERA: ISSIDAE)

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Abstract

In Kent, the planthopper *Issus coleoptratus* (Fabr.) if frequently found in sessile oak-birch woodlands with a high proportion of planted sweet chestnut. The preferred foodplants of *I. coleoptratus* nymphs were shown to be holly, yew and ivy in home-based assays. *Rhododendron ponticum* on which nymphs occasionally occur in the wild was found to be toxic to developing instars. Significantly more nymphs were found on holly trees growing in older-aged sweet chestnut stands than in 2 year-old chestnut coppice. Very few nymphs were found far from host trees and it was concluded that the presence of *Issus* in chestnut woodlands is largely due to local woodcutters who allow a certain proportion of secondary ‘non-crop’ tree species to survive. Nymphal frequency on holly varied little with tree height, with appreciable numbers of nymphs occurring on the lowermost branches at ground level, some of which had suckered, with equally high numbers occurring in the uppermost foliage (3 m). Nymphal numbers were recorded in February 2010 and compared with previous years.

Introduction

Issus coleoptratus (Fabr.) is one of two European members of the family Issidae known to occur in the British Isles (Plate 4, Fig. 3). Full descriptions of *I. coleoptratus* and its congener *I. muscaeiformis* (Schrank) are given in Dolling (1982), Holzinger, Kammerlander & Nickel (2003) and Beidermann & Neidringhaus (2009). They are our largest native planthoppers (7–9 mm). *Issus coleoptratus* is fairly widespread in southern England extending northwards and occurs primarily on holly, yew and ivy, whereas *I. muscaeformis* has a more localised northerly distribution and occurs on a range of tree and shrub species (Le Quesne, 1960; Dolling, 1982). In fact both issids have been collected from a wide range of shrub and tree species and it has been assumed that these are their hostplants. However whereas it is fairly easy to establish that insects with chewing mouthparts such as the larvae of Lepidoptera and many Coleoptera feed on their hostplants by observing damaged foliage and leaf mines, direct observation of feeding by sucking insects such as issids is more difficult to achieve.

In Kent, *I. coleoptratus* occurs primarily in woodlands and is often found in sessile oak-birch woods with a high predominance of sweet chestnut. Although these woods are regularly coppiced on an 11–15 year cycle mainly for chestnut, some patches of holly and other tree species are tolerated and many of these plants develop to maturity. From sampling it is evident that *I. coleoptratus* occurs frequently in relatively dark areas of woodland particularly on holly where few other insect species flourish. The main aim of this paper is to investigate the preferred foodplants of *I. coleoptratus* and its abundance in different aged stands of local chestnut coppice. In Germany, *I. coleoptratus* (hereafter referred to as *Issus*) tends to occur very low in the vegetation during the winter months (R. Remane, *pers. comm.*) in contrast to in Kent, where it is readily found at chest height (1.4 m) on suitable hostplants. The

opportunity was therefore taken to study the vertical distribution of *Issus* on holly during the winter months.

Methods

Survey site

Sampling was carried out in Perry Woods, Selling, near Faversham, Kent (TR045555). The 80 ha woodland on the North Downs was acquired by Swale Borough Council in 1980 and is used extensively by the public for amenity purposes. It has recently been designated a Local Nature Reserve. The woods are hilly and range from 80 m to 154 m above sea level. Extensive stands of Scot's pine and Douglas fir used to dominate the higher, more exposed ground, but since the Great Storm of 1987 only a few patches of these remain and the area is now covered largely by sapling birch, bracken and patches of heather *Calluna vulgaris*. The lower, outer areas of the woods consist mainly of sweet chestnut coppice with occasional sessile oak standards and a mixture of underwood species such as hazel, ash, field maple and holly (Wilson, 1911). Peterken (1981) classified the woods as sessile oak-hornbeam (subtype 9Bb) noting the occasional hornbeam and scattering of birch in the chestnut coppice. There is also an appreciable number of yew trees and seedlings. The timber is managed by English Woodlands.

Methods

This study forms part of a much wider investigation of the leafhopper and planthopper fauna of Perry Woods. Regular surveying was started in 1984. Four deciduous and three evergreen tree species (including holly) were sampled for Auchenorrhyncha every two weeks throughout the year using a standard-sized beating tray (area $0.75\,m^2$).

Feeding experiments were conducted using wild-caught third instar nymphs of *I. coleoptratus*. It was observed that recently-fed nymphs secrete long waxy filaments (1.0–2.0 mm) from dorsal pores above the anus (Plate 4, Fig. 3). The exact purpose of these glands in *Issus* is not yet known; in other hemipterous species they have been described as aiding the safe removal of honeydew by coating excreted droplets with waxy skeins thereby preventing bodily contamination (Pope, 1985). Fifteen batches of five nymphs kept on holly were anaesthetised with carbon dioxide, the waxy secretions removed with a fine scalpel and the insects placed in 3×1 inch glass tubes containing either holly, dead stems of holly or sweet chestnut. Observations over a 4 day period showed that all the nymphs with access to live holly secreted appreciable quantities of wax whereas none of the individuals exposed to dead plant material did. The secretion of waxy filaments was therefore used as a surrogate measure of feeding success. Host plant tests were conducted by offering four batches of 10 third-instar nymphs the leaves and stems of holly (live and dead), yew, ivy, *Rhododendron ponticum* and stems of sweet chestnut with buds at the pre-green stage. Wax filament production was observed over a four day period (during February–March).

The effect of coppice age on the abundance of *Issus* on holly was undertaken by counting the numbers of third to fifth instar nymphs from 10 beating tray samples taken at chest height during May 1991. One or occasionally two samples were taken from each tree (if two, then on opposite sides to minimize interference). Two different cants (a single coppiced area) were sampled for second and fourth year coppice, whereas all the samples for the older age groups came from within single large cants.

The vertical distribution of *Issus* on holly was studied during the winter period 1999–2000. Beating tray samples were taken from a group of 12 fully-grown holly trees in Perry Woods using a step ladder to take samples at 2 and 3 m. Since the aim was to record abundance, counts of all nymphal instars were included. The few adults noted through to December were excluded from the analysis as being representative of the previous generation.

Results

The tests show that *I. coleoptratus* fed readily on holly, yew and ivy, three of its main hostplants in Perry Woods (Fig. 1). A significantly smaller proportion of individuals fed on sweet chestnut and *Rhododendron*. Nymphs can be collected occasionally from both these species during the winter months but it is questionable as to whether they are feeding on these host plants at this time. *Issu*s may be able to feed on sweet chestnut, when the buds green-up and softer foliage is available. Although 30% of nymphs showed signs of feeding on *Rhododendron*, 90% died indicating the plant was essentially toxic to *Issus*. No mortality was observed with the other plant species.

Significantly more *Issus* nymphs were found on holly trees in 12 year-old sweet chestnut coppice (mean no. individuals, 5.38 ± 1.15) than in 2 and 4 year-old coppice (means, 0.91 and 1.75, respectively) (Table 1). The results indicated that there was an increasing trend towards higher numbers of *Issus* nymphs on holly trees in older aged sweet chestnut coppice. However these results apply to the Perry Woods complex and further sampling of similar woods nearby is needed to confirm this trend.

Sampling holly trees at various heights showed that *Issus* nymphs were present in appreciable numbers up to three metres, reaching the tops of several trees (Table 2). In autumn (October) nymphal frequency varied little with sampling height, with large numbers of *Issus* present on the very lowest branches at ground level, some of

Fig. 1. The percentage of *Issus coleoptratus* nymphs producing waxy secretions after 4 days and assumed to have fed on various host plants. No individuals exposed to dried holly produced waxy secretions and so the value is not included in the histogram above.

Table 1. The mean number of *Issus coleoptratus* nymphs on holly in sweet chestnut coppice of varying age, Perry Woods, Kent, May 1991

Chestnut coppice age (years)	Mean no. *Issus* nymphs per sample ($\pm$95% confidence limits) $n=10$
2	0.91 ± 0.52
4	1.75 ± 0.84
8	3.46 ± 1.59
12	5.38 ± 1.15

which had suckered and equally high numbers in the uppermost foliage (3 m). The numbers of nymphs at ground level subsequently declined during the winter months. Thus it was evident that *Issus* occurs high up in holly trees throughout the winter months. Overall numbers declined during January–February 2000 and this may have been the result of exceptionally strong winds experienced at the end of the century.

Sampling was undertaken at the same site in February 2010 after a very cold winter with frequent snow falls (Table 2). The results showed that significantly fewer *Issus* nymphs were found in 2010 than in 2000 but that their vertical distribution in holly was about the same as observed previously with approximately equal numbers of nymphs occurring at heights between 1 and 3 metres.

Discussion

Indirect feeding tests showed that *I. coleoptratus* feeds readily on holly, yew and ivy and less on other plants. Direct observations of *Issus*, for example on ivy, show that it probes in or on either side of a leaf mid vein in order to feed (*pers. obs.*). Once feeding has ceased, the insect removes its stylets and walks away. A small dark spot, probably from dried salivary secretions marks the site where the insect has fed. From the positioning of the insertion it is most likely that *Issus* taps into the xylem of its host plant. Members of the Issidae are presumed to be xylem feeders based on the shape and size of their mouthparts and body but no conclusive experiments (e.g. electrophysiological assays) have been carried out to confirm this (Novotny & Wilson, 1997).

Overwintering third instar nymphs of *I. coleoptratus* in chestnut coppice woodland are mainly restricted to their evergreen primary hosts, but occasionally individuals

Table 2. The vertical distribution of *Issus coleoptratus* nymphs on holly during the winter of 1999–2000 and February 2010

	Mean no. of *I. coleoptratus* nymphs per beat ($n=10$)						
Height (m)	October	November	1999 December	2000 January	February	March	2010 February
3	4.6	4	3.1	1.7	2	2.8	0.7
2	4.8	3.5	2.5	1.9	3.4	3.9	0.7
1	2.8	1.5	2.3	1.5	2.7	4.7	0.6
0.1	3.4	1	1.6	0.9	2.3	3	0.2

are found on chestnut some distance away from source populations. It is plausible to assume that if larger numbers of *Issus* occur on holly in older coppice then it is likely that more individuals will be found in the surrounding chestnut coppice. Twenty beating tray samples taken from chestnut, 10–60 m or 70–120 m away from source trees in coppice areas felled 1, 2, 3, 4, 6, 8, 10, 12 and 15 years previously failed to show any increase in issid numbers with coppice age (*pers. obs.*). Of the 180 samples taken, only six *Issus* individuals were found, five of which were 5–60 m from a source population. Thus *Issus* is largely restricted to its hostplants within a much larger area of planted chestnut and is not a true coppice insect – its presence there is due entirely to the whims of the local wood cutters who allow some additional secondary non-crop tree species to survive. These tend to proliferate in open areas beside footpaths and the main track ways used for clearing wood.

From the results it is evident that in Kent *Issus* may be found in appreciable numbers on holly throughout the winter period. It occurs not only at ground level on holly but also high up in the upper canopy. The reported difference in ecology of *I. coleoptratus* nymphs in central Europe where many individuals are apparently confined to the lower vegetation (R. Remane, *pers. comm.*) may reflect the colder winters there. The significantly lower numbers of *Issus* recorded in February 2010 after a cold 'continental' winter (the worst for 31 years) compared with the numbers recorded after a relatively mild winter in 2000 suggest that finding any *Issus* in winter in central Europe may be difficult. Even so it is likely that sampling the upper foliage of holly should reveal the presence of *I. coleoptratus* and that it has simply not been searched for at this height before. The apparently low numbers of *Issus* in 2010 should be placed in context. Counts of overwintering nymphs over the period 1985–1995 showed that the mean February value was 0.96 individuals per sample. Nymphal counts similar to or greater than those observed in 2010 were observed in six out of the 11 years during this period, indicating that nymphal numbers in 2010 are probably about average. However the winter periods were colder in 1985–1995 and so the numbers surviving in 2010 may be below the recent running average.

Issus coleoptratus females deposit their eggs on the ground surface and first instar nymphs appear on holly from the end of July onwards. Second instar nymphs appear in August through to April of the following year. Clusters of early instars are encountered from time to time and so it is possible that the relatively high numbers of nymphs recorded on the lowest branches in October represent recently emerged cohorts that are in the process of moving higher up into the foliage. Although the study was aimed at investigating the vertical distribution of *Issus* nymphs through the winter period it would be interesting to plot their distribution beginning in late July when the new generation emerges.

Issus nymphs appear capable of moving appreciable distances in their life time, moving at least 3 m vertically upwards from where their eggs were laid and probably moving greater distances horizontally among overlapping host trees. Nymphs have been encountered as high as 8 m in the canopy (*pers. obs.*). Their ability to survive on non primary hosts for a period of time suggests that there is a reasonable chance that a few individuals can disperse up to 80 m from their natal area (maximum distance recorded here from known hostplants). Chance movements may allow them to disperse over even greater distances. This contrasts greatly with many well-known insects such as leaf miners and seed feeders which barely move more than a few centimetres in their larval lifetime. Adult *Issus*, although winged tend to jump and glide a few metres rather than fly and so are capable of moving relatively short distances, probably of a similar distance to nymphs. There is no evidence of active dispersal by adults. The net result is that *Issus* is usually widely distributed within

individual woods but is far less frequently encountered on isolated host plants away from woodland.

Dispersal by nymphs is assumed to be primarily by walking. However nymphs may jump if disturbed, for example through the unexpected movement of a leaf or stem on which they are resting, or by the close approach of a large object, a presumed predator (*pers. obs.*). This 'escape response' has not been observed naturally under field conditions and so its prevalence and contribution, if any, to dispersal remains to be determined. Overwintering third instar nymphs can jump 'instantly' up to 60 cm when startled, even at subzero temperatures (Badmin, 2002). The jumping performance of adult *I. coleoptratus* has been studied in great detail and one female has achieved a take-off velocity as high as $5.5\,m\,s^{-1}$, considerably faster than the best jumps by the froghopper *Philaenus spumarius* (L.) (Burrows, 2009, 2010 in press). Acceleration was of the order of $1400–7000\,m\,s^{-2}$ equating to a g-force of 143–720. Not surprisingly, nymphs, which appear to accelerate at similar high speeds land at a variety of angles, often facing the direction from which they have jumped, but then quickly right themselves. It is not known whether nymphs that have jumped are able to land on nearby foliage or drop the full distance to the ground below. Adult *Issus* are able to achieve a greater measure of flight control and can probably remain amongst the foliage if disturbed. More studies are required to show the relevance of the jumping behaviour of Auchenorrhyncha in terms of survival and dispersal under field conditions.

Acknowledgements

The author wishes to thank John Jeffery for supplying the photograph of an *I. coleoptratus* nymph for use in Plate 4.

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FIRST INCURSION OF WHITE EUPHORBIA SCALE *SELENASPIDUS ALBUS* (HEMIPTERA: DIASPIDIDAE) IN BRITAIN, WITH A REVIEW OF *SELENASPIDUS* SPECIES FOUND IN BRITAIN

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ABSTRACT

In October 2009, a large infestation of *Selenaspidus albus* McKenzie (Hemiptera: Diaspididae) was found on a single *Euphorbia caput-medusae* L. plant grown under glass at the Royal Horticultural Society's Garden, Wisley, Surrey, England. Further investigation at Wisley in November found a single plant of *Euphorbia schoenlandii* Pax to be infested with the same scale species. Both plants had been imported from South Africa in May 2008. This is the first incursion of this scale insect in Britain and control measures are being taken. The biology and geographical distribution of *S. albus* are discussed. In addition, the incursions/interceptions of six other non-native *Selenaspidus* species in association with imported plant material in Britain are reviewed.

INTRODUCTION

In October 2009, staff at The Royal Horticultural Society's (RHS) Garden, Wisley, Woking, Surrey, noticed a large infestation of scale insects on a single potted plant of 'Medusa's head' *Euphorbia caput-medusae* L. (Euphorbiaceae) growing in a heated glasshouse. A sample was submitted to The Food and Environment Research Agency (Fera), where the scales were identified as *Selenaspidus albus* McKenzie (Hemiptera: Diaspididae), commonly known as the 'white euphorbia scale' (McKenzie, 1956). There were several hundred scale insects present on one stem. Most were live adult females but there were also hundreds of empty male scale covers, most abundant towards the top third of the stem. There were low numbers of live second instars, many dead first instars and a few dead winged adult males. A low number of glasshouse mealybugs *Pseudococcus viburni* (Signoret) (Hemiptera: Pseudococcidae), was also present in the sample. The plant had originally been imported from South Africa and exhibited at the RHS Chelsea Flower Show on the Kirstenbosch National Botanic Garden stand in May 2008. The plant had therefore been in Britain for approximately 18 months before the infestation was noticed. Further investigation at RHS Wisley during November 2009 found an additional small infestation of *S. albus* on a single *E. schoenlandii* Pax plant. The latter plant had also come from the Kirstenbosch National Botanic Garden stand at the Chelsea Flower Show in 2008.

The purpose of this communication is to report the first incursion (an isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future (FAO, 2009)) of *S. albus* in Britain and to review its geographical distribution and biology. In addition, the incursions and interceptions (detection of a pest during an inspection of an imported consignment (FAO, 2009)) of six other non-native species of *Selenaspidus* detected in Britain are reviewed.

Slide mounted specimens of *S. albus* are deposited at Fera.

Detection and identification

All developmental stages occur on the green parts (stems and/or foliage) of the host plant (Fig. 1). The adult female scale covers (Fig. 2) are 1.5 mm to 2.2 mm in diameter, circular, slightly convex, white with orange central exuviae. Adult female bodies are bright yellow but darken to orange with maturity. Adult female diaspids

Fig. 1 Heavy infestation of *Selenaspidus albus* on *Euphorbia caput-medusae*. Crown copyright Fera.

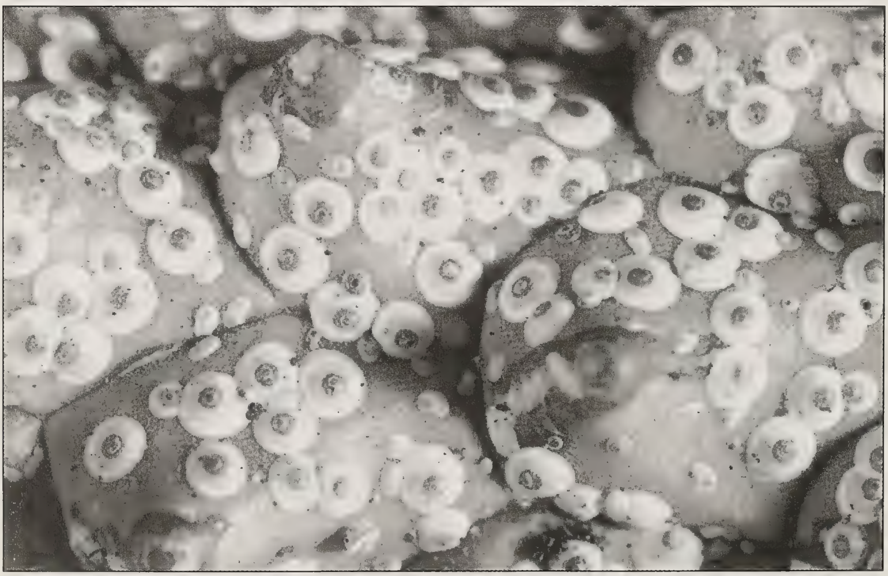

Fig. 2 *Selenaspidus albus*, adult female scales are circular, the males are much smaller and oval. Crown copyright Fera.

are usually completely hidden beneath a separate cover comprised mostly of exuviae and wax that is attached to the host plant. However, several of these adult females were partially or completely exposed. This occurred because their bodies grew so large and convex that they lifted the scale cover off or they only produced a partial wax covering. Male scale covers are much smaller than the female, 1 mm in length, oval, flat, white or yellowish-white with orange exuviae at the anterior margin.

Selenaspidus albus was originally described by McKenzie (1953) from specimens collected from *Euphorbia caput-medusae* in Norco, Riverside County, California, United States of America. Detailed morphological descriptions and illustrations of adult females are given by McKenzie (1953, 1956), Mamet (1958) and Gill (1997). There are currently 29 species assigned to the genus *Selenaspidus* and Mamet (1958) provides a key to 25 of those species (the four species described since Mamet's work are *S. aubrevillei* Balachowsky & Ferrero (1965), *S. eurylobus* Munting (1969), *S. latus* Munting (1967) and *S. quadrilobus* Munting (1969)).

Host range and biology

Selenaspidus albus feeds exclusively on *Euphorbia* species including *E. abyssinica* J. F. Gmel., *E. ?atrispina* N. E. Brown, *E. capitosa* N.E.Br., *E. caput-medusae* L., *E. clavarioides* Boiss. var. *truncata* (N.E.Br.) A. C. White, R. A. Dyer & B. Sloane, *E. fimbriata* Scop., *E. horrida* Boiss., *E. polygona* Haw., *E. pulvinata* Marloth., *E. submamillaris* (Bgr.) Bgr., *E. schoenlandii* (recorded here for the first time), *Euphorbia* sp. and *E. woodii* N.E.Br. (recorded here for the first time) (McKenzie, 1953, 1956; Mamet, 1958; Borchsenius, 1966).

The biology of *S. albus* has not been studied in detail. It appears to be able to reproduce sexually and parthenogenetically, as only females have been recorded in California (Gill, 1997).

Almost all the live scales in the sample from Wisley were adult females and it appears that this is the over-wintering stage. There were large numbers of dead first instars, many of which were stuck in the host latex. There were no signs of parasitism or predation in the population.

Geographical distribution

Selenaspidus albus is native to southern Africa but has been introduced to North America and Europe.

Afrotropical: Eritrea (Mamet, 1958); Namibia (Nakahara, 1982); South Africa (Mamet, 1958; Borchsenius, 1966). **Palaearctic**: England (single incursion reported here, under control), Germany (Danzig & Pellizzari, 1998), Italy (Marotta & Garonna, 1992). **Nearctic**: U.S.A. (California) (McKenzie, 1953, 1956; Mamet, 1958; Borchsenius, 1966: Gill, 1997).

Economic importance

Large populations of *S. albus* may cause plant damage and can lower the value of ornamental plants. In California, infested plants may be treated, or if heavily infested, they may be destroyed to control the pest (Gill, 1997).

One of the most economically important species of *Euphorbia* in Britain is poinsettia, *E. pulcherrima* Willd. ex Klotzsch, but *S. albus* has not been recorded feeding on this plant.

SELENASPIDUS SPECIES RECORDED IN BRITAIN

Seven non-native species of *Selenaspidus* have been found in Britain in association with imported plant material and/or indoor plantings. No species of *Selenaspidus* are currently established in Britain. The Plant Health and Seeds Inspectorate (PHSI) collected the samples listed below, unless stated otherwise.

Selenaspidus albus McKenzie – white euphorbia scale

In addition to the incursion recorded here, this species was intercepted on *E. woodii* imported directly from South Africa to the Royal Botanic Gardens (RBG), Kew, Surrey, 16 April 1996.

Selenaspidus articulatus (Morgan) – rufous scale

This species was apparently established at Worcester Park, Surrey, on *Ixora coccinea* L. (Rubiaceae), where E. Green collected it in June 1899 (Newstead, 1901). Newstead considered this a harmful pest that should not be allowed to spread although there is no mention of any control action being taken. It is not currently present in Britain but is established on indoor plantings in continental Europe (Danzig & Pellizzari, 1998).

Selenaspidus articulatus is commonly intercepted on a range of citrus fruit (Rutaceae) imported into Britain from the Neotropical region (Belize, Brazil, Cuba, Dominican Republic, Honduras, Jamaica, Peru, Saint Lucia, Trinidad and Uruguay) and has been found on one occasion on citrus from India. It has also been intercepted on *Mangifera indica* L. (Anacardiaceae) fruit from Peru, *Phoenix roebelinii* O'Brien (Arecaceae) foliage (for flower arranging) from Colombia and unspecified leafy vegetables from Nigeria.

Several transient incursions of *S. articulatus* have occurred in Britain on imported ornamental plants, mainly at commercial nurseries but also at a public botanical collection, university botanical research collection and a shopping centre: on *Alpinia* sp. (Zingiberaceae) from Barbados, 1988 and 1997; *Areca* sp. (Arecaceae) from the Netherlands, 2002; *Camellia* sp. (Theaceae) from Kenya, 1982; *Citrus* sp. from the Netherlands, 1985; *Dracaena* sp. (Dracaenaceae) from the Netherlands, 1977; *Elaeagnus* sp. (Elaeagnaceae) from Kenya, 1985 and 1991; *Howea forsteriana* Becc. (Arecaceae) from Ghana, 1977; *Theobroma cacao* L. (Malvaceae) from Jamaica, 2003, and Ecuador, 2006; and on *Trachycarpus wagnerianus* Hort. Ex Becc. (Arecaceae) from South Africa, 2003.

Selenaspidus kamerunicus Lindinger

Intercepted on fresh banana, *Musa* sp. (Musaceae) foliage imported from Uganda, 1998; ?Musaceae foliage from Nigeria, 2005; and ?*Aspidistra* sp. (Convallariaceae) from Ghana, 2005.

Selenaspidus pumilus (Brain)

This species was once considered established in Britain based on a finding at the Royal Botanic Gardens, Edinburgh, Scotland, on *Euphorbia* sp. by Dr. R. MacDougall in 1926 (Green, 1926). It is interesting to note that the pathway of introduction is similar to that of the current incursion of *S. albus*. The plant infested with *S. pumilis* was imported from South Africa to exhibit in the South African Court at the 1924/25 British Empire Exhibition, Wembley, before being transferred to Edinburgh. It is not currently present in Britain but is established on indoor plantings in Germany (Danzig & Pellizzari, 1998).

Selenaspidus rubidus McKenzie – red euphorbia scale

A large incursion of *S. rubidus* was found on *Euphorbia* sp., *Faucaria* sp.

(Aizoaceae) and *Opuntia brasiliensis* (Willd.) A.Berger (Cactaceae) grown under glass in Wortfield Gardens, Bridgemouth, Shropshire, October 1964, by S. Blore. It is established on indoor plantings in Germany (Danzig & Pellizzari, 1998).

Selenaspidus spinosus Laing
Incursion at a commercial nursery in Cheshire, on *Toddalia nobilis* Hook.f. ex Oliver (Rutaceae) imported from Kenya, collected by R. Watkins in March 1976.

Selenaspidus taizi Marmet
Incursion at the RBG Kew on a *Euphorbia* sp. plant imported from North Yemen, October 1979.

Discussion

This is the first published incursion of *S. albus* in Britain and it is currently being controlled under the guidance of Fera. The biology of this species is largely unknown but it feeds exclusively on *Euphorbia* species and appears to be able to breed parthenogentically and sexually. It is a sub-tropical species that is unlikely to be able to naturalise in Britain but could establish in glasshouse botanical collections. It is a successful coloniser, and has been introduced to the USA, Germany and Italy.

Selenaspidus species are native to the Afrotropical region with a single species native to the Middle East. Seven *Selenaspidus* species have been detected in Britain and at least four of these species, *S. albus, S. articulatus, S. pumilus* and *S. rubidus* appear to have bred on indoor plantings in Britain for several months, and in some cases for years. Three of the species recorded in Britain have already been spread widely elsewhere in commerce: *S. articulatus* occurs throughout the tropics and subtropics, and in glasshouses in temperate regions; *S. albus* and *S. rubidus* have been found in various parts of the world, most frequently on *Euphorbia* plants grown in botanical collections. There is, however, no evidence that any of these species are currently established in Britain and the single incursion of *S. albus* is under control.

Euphorbiaceae is the most important host-plant family for the genus *Selenaspidus* and eleven *Selenaspidus* species are recorded feeding on them. Many Euphorbiaceae are important ornamental plants and their popularity in Britain means that there is a demand for exotic species that provides a potential pathway for the introduction of *Selenaspidus* species.

Any findings of suspected non-native plant pests should be reported to the local Fera PHSI office or to the PHSI HQ, York (Tel.: 01904 465625).

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SHORT COMMUNICATIONS

***Drepanepteryx phalaenoides* (L) (Neuroptera: Hemerobiidae) in east Kent.** – The striking brown lacewing *Drepanepteryx phalaenoides* (L) (Plate 4, Fig. 4) is most often encountered in dense deciduous woodland containing mature oak trees, where it is attracted to light (Plant, 1994, Provisional atlas of the lacewings and allied insects (Neuroptera, Megaloptera, Raphidioptera and Mecoptera) of Britain and Ireland), pp. 142–143). Consequently, it should have been no surprise when on 1 July 2009 an individual of this species was attracted to an m.v. light I was running in Burnt Oak Wood, Orlestone (TQ9834), as the locality comprises very dense woodland containing numerous oak standards. However, *D. phalaenoides* is a remarkable example of dead leaf procrypsis and I was most pleased to encounter it in its natural environment. The British Isles distribution map shown in Plant (1994) indicates a rather discontinuous distribution, with a southern group of records (mostly Kentish Weald, Surrey and Home Counties north-west of London) and a northern group (northern England and southern Scotland), although there are single outliers in Wales and Ireland. There appear to be very few additional dots on the distribution map published by the National Biodiversity Network, so it would seem that few records have been added in the interim since 1994. Accordingly, I would encourage lepidopterists who encounter this unusual lacewing in the course of their m.v. trapping exploits to bother to record its presence.

Acknowledgement: the author would like to thank the Kent Wildlife Trust for permission to record insects in Burnt Oak Wood. P. J. Jewess, Boyce's Cottage, Newington, Sittingbourne, Kent ME9 7JF; e-mail: philip_jewess@hotmail.com.

Recent records of some scarce invertebrates from the Isle of Wight. – Recent sampling of fen and saltmarsh habitats on the Isle of Wight yielded records of several species for which I cannot find previous records from the Isle. These are marked with an asterisk.

Freshwater Marshes (SZ3486) on 25 June 2009:
Diptera: Tephritidae: *Philophyla caesio* (Harris)*, one male swept from sallow bushes. According to Clemons (1996) there are no records from the island.
Coleoptera: Carabidae: *Trichocellus placidus* (Gyllenhal)* several found amongst fen litter in the marsh, with a male *Acupalpus parvulus* (Sturm)* these appear to be the first records for VC9 (Mark Telfer, *pers. comm.*) other carabids included *Stenolophus mixtus* (Herbst), and *Agonum thoreyi* Dejean.

Staphylinidae: *Stenus aceris* Stephens*, adult male from leaf litter at edge of reed bed, *Stenus nitens* Stephens*, adults active at base of emergent *Phragmites* stems and *Carex* tussocks.

Kateritidae: *Kateretes pusillus* (Thunberg)* two teneral males swept from *Carex*. Kirk-Spriggs (1996) does not record this species from VC10, and this may be a new record for the Isle.

Apionidae: *Ischnopterapion modestum* (Germar)* one knocked off Greater bird's-foot-trefoil *Lotus pedunculatus* growing in reed swamp.

Newtown Harbour (SZ4190) on 24 June 2009.
Diptera: Tabanidae: *Atylotus latistriatus* Brauer*, several teneral adults seen climbing up low saltmarsh plants, presumably post emergence; others also attempting to bite!

Tephritidae: Adults of *Myopites eximius* Séguy (Plate 4, Fig. 5), numerous on flowerheads of Golden Samphire *Inula crithmoides*.

Brading Marshes (SZ6389) on 24 June 2009
Hemiptera: Miridae: *Capsus wagneri* (Remane)*, adult males swept from upper transition saltmarsh. Identification of this problematic species is subtle, but was confirmed by Bernard Nau.

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Pediopsis tiliae **(Germar) (Hemiptera: Cicadellidae) in Middlesex.** – Adults beaten from low branches of isolated mature common lime trees growing in open amenity grassland in Kensington Gardens (TQ2680) and Hyde Park (TQ2780) on 18.viii.2009. These appear to be the first records from VC21. – JONTY DENTON, Old Hall Place, Hussell Lane, Medstead, Hampshire, GU34 5PF.

A gynandromorph of glasshouse whitefly *Trialeurodes vaporariorum* (Hemiptera: Aleyrodidae) (Westwood). – Yellow sticky traps are routinely used to monitor whitefly populations on indoor plantings in the UK. Hundreds of traps are submitted to The Food and Environment Research Agency (Fera) each year for screening under low magnification to detect whiteflies of quarantine significance using the protocol described by Malumphy *et al.* (in press). Between 2004 and 2009, tens of thousands of adult whiteflies were examined on sticky traps. Adult male and female whiteflies are easily separated by the external morphology of their reproductive organs (Gill, 1990). The most conspicuous character is the pair of male parameres (claspers) located at the posterior apex of the abdomen. Daniel Pye, one of the technicians screening the traps at Fera, spotted an unusual glasshouse whitefly *Trialeurodes vaporariorum* (Westwood) (Hemiptera: Aleyrodidae) specimen amongst more than a hundred adults on a single trap taken from a commercial glasshouse in Norfolk, England, 3 October 2006. The specimen had parameres but the abdomen contained oval structures that appeared to be eggs. The specimen was removed from the trap and slide mounted in Heinz medium using the methods given by Malumphy *et al.* (in press). It was examined using a Leitz Diaplan microscope with phase and interference contrast using magnifications up to ×1250. The specimen was found to have external male and female reproductive organs positioned dorsally/ventrally respectively (Fig. 1). The parameres and aedeagus were only about half the normal length and the aedeagus was wider than average (compare Figs 1 and 2). The ovipositor (gonophysis) appeared normal. The rest of the abdomen was morphologically female; for example, there were two pairs of ventral wax plates. Male abdominal characters such as disc pores, terminal 'collar' (8th–10th abdominal segments) and four pairs of ventral wax plates were absent. The internal morphological structures were also female, for example the cement gland and valvifers (Malumphy *et al.*, 2009). In addition the abdomen contained fully-formed eggs, each one with a peduncle (stalk). Unfortunately it was not possible to determine if the specimen could lay eggs (as it had died on the trap), but there appeared to be no morphological reason why it could not. The presence of eggs does not imply that the specimen had mated as *T. vaporariorum* can reproduce parthenogenetically as well as sexually. Gynandromorphs (organisms that contain both male and female characteristics) are widely reported in the Insecta, most commonly in the Diptera, Hymenoptera and Lepidoptera, but are rarely reported in

Fig. 1. Gynandromorph of *Trialeurodes vaporariorum*: aedeagus length 50 microns. Crown copyright Fera.

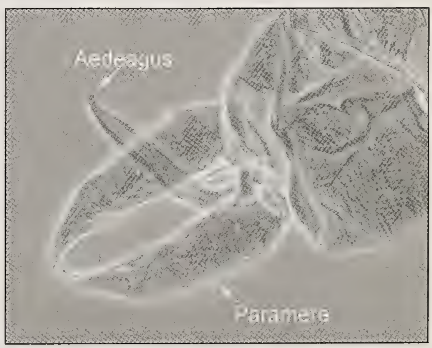

Fig. 2. Male reproductive organs of *Trialeurodes vaporariorum*; aedeagus length 108 microns. Crown copyright Fera.

the Hemiptera. This appears to be the first published report of a gynandromorph in the Aleyrodidae. The incidence is evidentially extremely low in *T. vaporariorum* given that only a single gynandromorph was observed amongst tens, or possibly hundreds, of thousands of whitefly specimens examined. – CHRIS MALUMPHY, The Food and Environment Research Agency, Sand Hutton, York, YO41 1LZ, UK.

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***Hyalopsocus morio* (Psocoptera: Psocidae) rediscovered in Britain.** – On 23 June 2009 I was pruning back some Virginia creeper from the top of a rendered Cotswold stone and brick house in Lechlade town centre (gridref SU2199) in Gloucestershire. The aspect was southwest and the house is at least 200 years old and covered with lichens under the creeper. As I removed the creeper a number of psocopterans scuttled about over the surface. There were two pale, well-camouflaged species, the common *Loensia variegata* (Latreille) and the very scarce *Blaste quadrimaculata* (Latreille) (a new county record). The most numerous (approximately 40) however was a shining black species of similar size. This I identified later as *Hyalopsocus morio* Roesler (Plate 4, Fig. 6), confirmed by Bob Saville, the National Barkfly Recording Scheme organiser. New (2005) described this species as not having been recorded from the British Isles since 1867 from Kent; Kimmins (1941) listed a few reports prior to that from East Kent, Surrey and West Sussex, based on literature and museum collections; and Bob Saville confirmed that there have been no records since. This species is distinguished from all other British species by its forewings, which are entirely brown with the basal half darker. Bob Saville would be interested to hear of any further finds. The equivalent natural habitat could possibly be limestone rocks covered with ivy, but buildings in suitable areas should be checked out. My searches of similar sites around the Cotswolds during 2009 have not produced any further colonies (*H. morio* was still present at the above site on 17 August). This colony is well established so is this species a longstanding British resident or the result of accidental introduction (males of this species have not been found and it is believed to be parthenogenetic)? Some live specimens of *H. morio* were sent off to Brian Valentine to be photographed and these can be seen on the Barkfly website. – DAVID SCOTT-LANGLEY, 19 Chesterton Grove, Cirencester, Gloucestershire GL7 1XN.

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OBITUARY

REVD ANTHONY HALL HARRISON HARBOTTLE
MA, LVO, FRES
1925–2009

In 2005 I received a curious note from Anthony Harbottle. My wife and I had been invited to lunch and two days before, a short letter arrived which said 'Looking forward to Thursday, can you bring me comfrey – a nice bushy plant in good order'. I did what he wanted and found that he was breeding Scarlet Tiger *Callimorpha dominula*. He told me that because of a painful hip and knee he had not been able to get out and find the plant himself – he was eighty at the time. When we received the sad news that Anthony had died it seemed that British entomology had lost another of its great characters. He was born in 1925, the second son of Alfred and Ellen Harbottle, and was educated at Sherborne School and Christ's College, Cambridge before entering Wycliffe Hall to train for the Ministry. During the Second World War he served in the Royal Marines, but afterwards, was Deacon and later Priest of several parishes. From 1968–1981 he was Chaplain of the Royal Chapel, Windsor Great Park and from 1968–1996 he was Chaplain to HM the Queen at Windsor Great Park. He said that he was privileged to preach to the Queen more than any other chaplain before or since and often peppered his sermon with entomological references. He delighted in telling me how the Queen Mother 'would, every now and then, drop in' to view his collection of butterflies and moths and enjoy tea and doughnuts. In his ministerial role he was frequently invited to say grace and performed this task for the Entomological Club at numerous Verrall Suppers during the 1970s to 1990s.

Anthony Harbottle was a collector's collector. He never did things by half, and he always had phenomenal luck; very much in the same manner as his contemporaries, Bernard Kettlewell and Eric Classey. In 1949 he chanced upon Berger's Clouded Yellow (*Colias alfacariensis*) in the Dover-Folkestone area of Kent and the account of this adventure is hilarious. Having been told by a railway official that he was trespassing on railway land 'I perched myself just the other side of the railway's

property but within full view of the beloved hunting ground. This forthright devotion to duty on the official's part proved to be a blessing in disguise. Almost immediately I observed a female *C. alfacariensis* of the white form . . . I slammed the net over it and boxed it . . . in so doing I smashed the ferrule of my umbrella, which I was using as a stick and which I eventually left in the compartment of a railway carriage. A few minutes later I caught a second male, although I think I had to trespass to do so.' Anthony was the first person in this country to breed the species and, in an important paper, he elegantly described the life cycle for the first time.

Five years earlier, he chanced upon the Bath White (*Pontia daplidice*) as he walked along the edge of the golf course at Bude. He had no net with him at the time but rushed to the house of a friend in order to borrow one. Grabbing his friend's bicycle he raced back to the golf course, and on arrival found that he was in the middle of a hatch-out of the species and which, in the course of the next few days, he relentlessly pursued. His luck lasted for almost a week. 'On the second of October I caught an enormous female in very fine condition. This was the last specimen seen or taken, and brings my total to forty seven *daplidice*, of which twenty-nine were males and eighteen females.' In 1998 Anthony was made a Special Life Member of the British Entomological and Natural History Society, an honour that he was very proud of. Anthony Harbottle was one of the most remarkable lepidopterists that I have ever met. Enthusiastic to the last, he loved talking about his beloved Lepidoptera and did so with all the enthusiasm that must have emanated from him as a young man.

Michael Salmon

BOOK REVIEWS

The Leicestershire Coleopterists. 200 years of beetle-hunting by Derek Lott. Published by Loughborough Naturalists' Club, 2009. 60 pages (plus 14 colour and monochrome plates). Price £8 per copy plus p&p. ISBN 978-0-9562815-0-0.

A fascinating and well-written account of the history of people with a special interest in the local beetle fauna of Leicestershire. This county has been fortunate in having a long list of resident beetle enthusiasts and it would be interesting to know if this is typical of other UK counties or not. I suspect Leicestershire has been particularly fortunate. I am aware that, for example, the counties of Gloucestershire, Devon and Cornwall have not been so well served. This is social history as well as a history of entomology.

The account starts as far back as 1782 with the Reverend George Crabbe, moves through the mid 19th century with Henry Walter Bates, the lean years of the later 19th century, Frank Bouskell around the turn of the century, and then into the busier 20th century, with its development of beetle recording rather than just collecting. The author has painstakingly extracted personal information on the people concerned and examined their attitudes and relationships as well as the entomology. It really is fascinating to read of the occupations of these enthusiasts and how they fitted in their hobby with their profession.

The reader is then brought right up to date with sections covering 'Changes in the Leicestershire beetle fauna' with interesting accounts of Bradgate Park and Buddon Wood, two of the county's most important sites.

Accounts such as this merit national publicity if they are to stimulate other would-be beetle historians. This account demonstrates the value of such documentary research and its potential interest for people with or without a local connection.

Keith N. A. Alexander

Key to the identification of British centipedes by A. D. Barber. Published by Field Studies Council Publications, Shrewsbury, 2008. 96 pages (plus 16 colour plates). Price £8 per copy plus £2 p&p. ISBN 978-1-85153-242-1.

The AIDGAP project was established to provide Aids to Identification in Difficult Groups of Animals and Plants. It has produced many identification handbooks which achieve this admirably, although some suffer from inadequate supporting illustrations or cross-referencing of technical terminology to comprehensible explanations. Ted Eason's (1964) *Centipedes of the British Isles* was a major inspiration of interest in the group but suffered from difficult identification keys. The publication of this new AIDGAP identification key was eagerly anticipated, but perhaps the group really is very difficult.

Centipedes are not for the faint-hearted and this key should perhaps not be recommended to true beginners. Its main users will be people with a good basic knowledge of the group, people who have already overcome the hurdles of the anatomical nomenclature and already know their way around a centipede. A beginner will be seriously daunted by the technical terminology and the lack of sufficient well-placed illustrations. This will be compounded by the identification couplets often being rather too heavy – too much information! The emphasis should be on a few key all-or-nothing characters with the "ifs, buts and whens" relegated to a subsection where they won't be so distracting. The Glossary however does seem very useful and makes up – to some extent – for too few illustrations.

One thing that this book needs is some full-page line drawings of typical examples of the centipede families with the key structural features well-labelled and especially well-described. This could then be linked to the close-up illustrations of the features already provided. The next requirement is for illustrations of **all** the other features. Comparative couplets need illustrations of both options, not just one. The way forward for beginners must be to attend identification courses run by experts who can then offer coaching in the use of the AIDGAP handbook. Once the hurdles of breaking into this group have been overcome, this AIDGAP guide will undoubtedly enable the more experienced naturalists to better familiarise themselves with the range of British species. The key has been through the usual testing process and apart from a few minor points has been received very positively. The book includes advice on how to find the species, a checklist of the species which have been found here, and lots of detailed information describing the various species and what is known about their habitat associations, seasonal occurrence, and occurrence across Britain and Ireland.

Keith N. A. Alexander

SHORT COMMUNICATION

The discovery of *Pandivirilia melaleuca* (Diptera: therevidae) in Worcestershire. – The stiletto fly *Pandivirilia melaleuca* (Loew) was recorded in Worcestershire for the first time when I collected a female from Mill Meadow, Drakes Broughton, (SO919483) on 25.vi.2009. The weather conditions at the time of capture (15.00h) were warm and humid with a temperature of 24°C. At the time I was attempting to photograph and capture aculeate Hymenoptera from the decaying remains of an oak stump of about 1.5 metres in height. I became aware of an insect moving somewhat erratically through rank vegetation at the base of the stump, in a manner not unlike a pompilid wasp. I realised that I should collect this unfamiliar insect immediately using my hand net. This proved to be quite difficult amongst the dense grasses but I was able to finally capture it; unfortunately two of its legs became dislodged during the process.

Figure 1. *Pandivirilia melaleuca* female. Note the entirely black femora which are yellow-tipped in the closely-related therevid *Cliorismia rustica* Panzer.

Upon returning home it became apparent that I had collected a fly belonging to the family Therevidae which keyed out as a female *P. melaleuca* using Stubbs & Drake (2001). I was then surprised to read in the species account of its rarity within the British Isles. Windsor Forest and the immediate neighbourhood are mentioned as the only certain localities in Britain for *P. melaleuca.* There are also larval records from the London area (Allen, 1981; Owen, 1993), and at Cirencester Park, Gloucestershire (Alexander, 1994). The text goes on to mention 'a female observed rapidly zig-zagging from side to side close to the ground in front of an old red-rotten oak'. The larval development occurs inside dry, red-rotten oak normally but can also occur in damp rotten beech (Owen, 1993). Since that text was written *P. melaleuca* has been confirmed without doubt as a Gloucestershire species where a larva has been reared from pear (Alexander, 2007). It would appear that there is a population encompassing the triangle Gloucester, Cirencester and Worcester.

Mill Meadow is a small nature reserve currently managed but not owned by Worcestershire Wildlife Trust. It is maintained as a meadow known not to have been ploughed for at least 75 years; it has a rich and varied flora and is surrounded on three sides by a large block of woodland comprising predominantly oak and ash. These woods are not protected for wildlife and are privately owned. I have recorded many uncommon insects from Mill Meadow, a high percentage of which are entirely dependent on dead wood for part of their life-cycle.

The specimen was photographed and the image sent as an e-mail attachment to Steve Falk who agreed with my initial identification. – KEVIN A. MCGEE, Frondeg Farm, Penrhyncoch, Aberystwyth, Ceredigion, SY23 3EF

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FIELD MEETINGS

Ashclyst Forest, Devon, 23 May 2009

Leader: **Roy McCormick**. – The evening was kind to us with a promised temperature of 10°C, but the cloud cover dispersed and we though we were in for a cold night; but it stayed relatively warm. Steve Hatch, Dave Paull and the leader had decided to do a bit of beating in the afternoon to try and find larvae of *Apocheima hispidaria* (D. & S.) (Small Brindled Beauty). We did not see any although we recorded several species of larvae common to woodland including bucket loads of *Erannis defoliaria* (Clerck) (Mottled Umber) in all the colour forms from yellow right through to dark brown. By the time we finished our meal in the local hostelry, people had started to arrive and we soon had six people with equipment and 18 others, including a couple of families; 24 in all, so a good turn out for our first field meeting of 2009. With such a vast array of places to trap, even within the confines of this parking/picnic spot, we soon had all our traps in place; a good job we did not have any commercial aircraft flying over as they might have thought we were Exeter Airport!

By the time the health and safety talk had been given, and with people widely spread, night had fallen and there was no time for dusking. After the traps had been running for a while the number of species gradually built up and the company were pleased to see a diverse range of moths. New species were boxed and handed around for inspection and though this process took a good deal of time, it was good to give everyone the chance to see all the wonderful species we had trapped. It took at least a couple of hours to go round the various traps and we finished up with a total of 56 species, with the best of these: 1 *Watsonalla cultraria* (Fabr.) (Barred Hook-tip); 1 *Hemistola chrysoprasaria* (Esp.) (Small Emerald); 1 *Scopula floslactata* (Haw.) (Cream Wave); 2 *Chloroclysta siterata* (Hufn.) (Red-green Carpet); 2 *Plagodis pulveraria* (L.) (Barred Umber); 2 *Menophra abruptaria* (Thunb.) (Waved Umber); 1 *Clostera curtula* (L.) (Chocolate Tip); 3 *Peridea anceps* (Goeze) (Great Prominent); 20 *Eilema sororcula* (Hufn.) (Orange Footman) (we obviously hit this on the right night) and 1 *Arctia villica britannica* Ober. (Cream-spot Tiger), a surprise seeing this and the best moth of the night. Some of the people left us around midnight having had a very enjoyable evening, but we carried on in the hope of recording our target, *Cyclophora porata* (L.)(False Mocha). Although we carried on until after 01.00h, leaving the site well after this time, we did not find this UK Biodiversity Action Plan species. Nevertheless, the field meeting was well worth while.

Escot Park, Devon, 20 June 2009

Leader: **Roy McCormick**. – The site was visited early so as to greet the expected members of the public, as this event was promoted on the local radio. Twenty-four people attended, although only six were members of the Devon Moth Group, with Charlie and Sam Stripp bringing their family. The other members were Mike Meehan, Una Garland and Derek Smith, with only Derek having equipment on board. We also had two prominent members of the Devonshire Association, one of whom brought their family along. Following a health and safety talk from the prepared risk assessment sheet we set up our four light-traps. We were trapping in the wetland area and so expected hoards of flies, but fortunately we were not bothered too much, although the mosquitoes were biting well! Trailing round with 24 people was a bit of a struggle, but we managed to hand round a reasonable number of moths for inspection and discussion. By 23.30 h most of those present had said their goodnights, having had an enjoyable night's moth recording. Those remaining carried on until midnight, and with little coming in on this chilly night, it was decided

to pack up. Sixty-four species were recorded, with many only in single figures. The best were: 1 *Caloptilia stigmatella* (Fabr.); 1 *Epermenia falciformis* (Haw.); 2 *Tethea ocularis octogesimea* (Hübn.) (Figure of Eighty); 1 very worn *Eilema sororcula* (Hufn.) (Orange Footman) and 1 *Schrankia costaestrigalis* (Steph.) (Pinion-streaked Snout).

Dawlish Warren, Devon, 4 July 2009

Leader: **Roy McCormick**. – The leader arrived at the meeting place only to discover that his clipboard, which had the combination number of the gate lock, had slid off the top of his car when he drove away from home – DISASTER!! By this time, several members had arrived and despite best efforts, the lock number remained elusive. It was decided that the only way was to carry the equipment through and run the lights in the area just inside the gate; there was sufficient tree cover for us all to get spots with a good mixture of reeds and other plants. We finished up with 19 members and 13 traps spread out over a wide area, so not too bad after all! A little dusking produced few moths, so to the sounds of music wafting across the Warren we settled down to inspecting our light-traps. With so many traps and a good following of members, the whole round took us well into the night. Fortunately it was dry, although a little chilly with the temperature staying around 12°C.

The species list by this time stood at around 90, and by 23.30 h, some of the party had started to drift away having had an interesting evening. The remaining half dozen visited the traps again and increased the list to over 100 species, but with only around a dozen of those in double figures. The final list topped 140, of which the most interesting species were: 1 female *Zeuzera pyrina* (L.) (Leopard); 2 *Argolamprotes micella* (D. & S.); 3 *Epinotia cruciana* (L.) (Willow Tortrix); 3 *Ostrinia nubilalis* (Hübn.) (European Corn Borer); 3 *Oidaematophorus lithodactyla* (Treit.); 1 *Tethea ocularis octogesimea* (Hübn.) (Figure of Eighty); 3 *Plemyria rubiginata* (D. & S.) (Blue-bordered Carpet); 4 *Eupithecia tenuiata* (Hübn.) (Slender Pug); 2 *Epione repandaria* (Hufn.) (Bordered Beauty); 2 *Apeira syringaria* (L.) (Lilac Beauty); 6 *Meganola albula* (D. & S.) (Kent Black Arches) – one of the specialties of the site; 3 *Agrotis vestigialis* (Hufn.) (Archers Dart); 3 *Mythimna conigera* (D. & S.) (Brown-line Bright-eye); 1 *Acronicta aceris* (L.) (Sycamore), a species that has been getting more common in Devon; 1 *Amphipoea oculea* (L.) (Ear Moth) and 9 *Earias clorana* (L.) (Cream-bordered Green Pea), another speciality of the site. We left the site well after 02.00 h having had a good, albeit, full-moon night.

Braunton Burrows, Devon, 11 July 2009

Leader: **Roy McCormick**. – After weeks of reasonable or good weather, the clouds gathered and the rains descended. It was like 2008 all over again. After heavy rain from 16.00 h onwards, the event was officially called off – the right decision as the heavy rain and near gale force winds continued until the small hours. This small report was kindly generated by Richard Fox who was there during the day.

Stodmarsh National Nature Reserve, Kent, 12 July 2009

Leader: **John Badmin**. – Equal numbers of Kent Field Club and British Entomological and Natural History Society members met at Grove Ferry by the river Stour, not far from Canterbury, for a visit to the eastern side of Stodmarsh National Nature Reserve. Overnight rain meant that conditions for recording invertebrates were not ideal, but the early appearance of the sun combined with a steady drying breeze quickly improved matters, and apart from a slightly below-average temperature, most insect orders put in an appearance during the day.

This area south of the river comprises a mosaic of *Phragmites* reed beds and rough grazing pasture with reed beds predominating nearer to the lakes. Reasonable numbers of red admiral, painted lady, comma and meadow brown butterflies were noted, some nectaring on bramble and thistle flowers and several cinnabar moths were observed flying. Bumblebees were in evidence; *Bombus pascuorum* (Scopoli), *B. lapidarius* (L.) and a few *B. lucorum* (L.). Numerous patches of field grasshopper *Chorthippus brunneus* (Thunb.), both adults and late instar nymphs, were encountered as we walked across the fields. Nymphs of Roesel's bush-cricket *Metrioptera roeselii* (Hagenbach) were found in taller vegetation not far from the footpaths.

Sampling two-metre high *Phragmites* is never an easy task: one can use a sweep-net to sample the upper, more pliable stems, by vigorous sweeping of the net, but insects resting or feeding in the vegetation tend to escape at the slightest degree of disturbance. An alternative approach is to very carefully position an open beating tray behind a clump of stems and to tap insects on to it, and then carefully remove the beating tray. This way one does sample insects low down in the vegetation. However, in truth, both methods are fairly inefficient. It was nice to find the translucent green planthopper *Chloriona smaragdula* (Stål) in reasonable numbers but despite regular sampling the leader failed to find *Euides speciosa* (Boheman), which Laurence Clemons had found here in the recent past.

In open habitats the commonest hopper appeared to be the meadow spittlebug *Philaenus spumarius* (L.) though appreciable numbers of *Neophilaenus lineatus* (L.) and *Conomelus anceps* (Germar) were also present. Two other froghoppers, *Aphrophora alni* (Fallén) and *A. salicina* (Goeze) were also recorded. An unexpected find was the handsome leafhopper *Athysanus argentarius* Metcalf and several *Aphrodes makarovi* Zachv. Laurence Clemons recorded seven species of mirid bug including *Stenodema trispinosum* Reuter, *S. calcatarum* (Fallén) and *Deraeocoris flavilinea* (Costa).

Laurence's efforts resulted in more than 80 species of Diptera being recorded during the day. Notable chloropids were *Melanochaeta pubescens* (Thalhammer), *Meromyza pluriseta* Peterfi and *Speccafrons halophila* (Duda). The sounds of horseflies were noted from time to time: including the ubiquitous *Haematopota pluvialis* (L.) but interestingly the RDB3 yellow-horned horsefly *Hybomitra ciureai* (Séguy) which is a local species largely confined to grazing levels in southern Britain and known from very few sites in Kent. Soldier flies were very much in evidence as to be expected, nine species in total, the best of these *Vanoyia tenuicornis* (Macquart) (Notable B). Sixteen hoverflies were observed including the bright-yellow coloured *Helophilus pendulus* (L.) and *H. hybridus* Loew, drone fly *Eristalis tenax* (L.) and *Rhingia campestris* Meigen.

Tephritids are Laurence's speciality and he noted nine species during the day including the notable *Dioxyna bidentis* (Robineau-Desvoidy) and *Myopites inulaedyssenteriae* Blot whose larvae feed in the capitula of composites such as common fleabane *Pulicaria dysenterica*, and other composite feeders such as *Tephritis formosa* (Loew), *T. neesii* (Meigen), *Terellia ruficauda* (Fabr.) and *T. tussilaginis* (Fabr.).

So, a surprisingly interesting day despite the weather forecast. We also bumped into two unusual plants – a huge yellow composite:- marsh sow-thistle *Sonchus palustris* and marsh valerian *Valeriana dioica*, both decidedly local species in Kent.

The President, Brian Elliott, timed it just right and arrived just as the daytime meeting was finishing. Both he and Philip Jewess then made an inspection of the marshes to select suitable places to position their light-traps. Quite a lot of field work

was undertaken at this time as the sun was setting. Species of interest were *Stigmella plagicolella* (Stainton) and *Parornix finitimella* (Zeller) (a few individuals on a newishly planted blackthorn hedge around a picnic site); the bagworm *Psyche casta* (Pallas) (three larval cases); *Caloptilia stigmatella* (Fabr.) (a few cones on *Salix pentandra*); *Agonopteryx alstromeriana* (Clerck) (lots of larval evidence on hemlock); *Mompha epilobiella* (D. & S.) on great willowherb: *Apodia bifractella* (Duponchel) on fleabane and Puss moth larvae on sallow around a bird hide. With plenty of specimens in plastic bags for later identification we then retired to the warmth of the public house for a splendid meal.

The night turned out to be rather cold with an increasingly strong wind coming from the west and so moth numbers were lower than hoped for. In the end we recorded close to 100 species of Lepidoptera. Those that put in appearance included: *Euthrix potatoria* (L.) (Drinker): *Deilephila elpenor* (L.) (Elephant hawk-moth); *Pterostoma palpina* (Clerck) (Pale prominent); *Nudaria mundana* (L.) (Muslin footman); *Apoda limacodes* (Hufn.) (Festoon); *Mythimna obsoleta* (Hübn.) (Obscure wainscot); *Chilodes maritimus* (Tausch.) including ab. *wismariensis* (Silky wainscot); *Arenostola phragmitidis* (Hübn) (Fen wainscot); *Macrochilo cribrumalis* (Hübn.); thousands of *Acentria ephemerella* (D. & S.) (Water veneer); *Donacaula forficella* (Thun.) and *Chilo phragmitella* (Hübn.). However we were not able to confirm the presence of the gelechiid *Monochroa niphognatha* (Gozmány), which was recorded as new to Britain from here in 1984, probably because we were too late in the season.

There were lots of hydroptilid micro-caddis on the white sheets beside the traps as well as a few individuals of *Oecetis ochracea* (Curtis), *Leptocerus tineiformis* Curtis, *Agrypnia pagetana* Curtis and a male *Limnephilus binotatus* Curtis (third Kent record, *pers. comm.* Ian Wallace, who kindly identified the caddis).

The leader would like to thank David Rogers of Natural England for permission to record during the day and to use light-traps during the evening.

Sandpool WWT reserve, Oaksey, by Cotswold Water Park, Wiltshire, 19 July 2009

Leader: **Paul Waring**. – This meeting commenced at 14.00h and 20.30h on what was a day of very mixed weather. There were warm sunny periods in the morning and the middle of the day and intermittent heavy showers after noon, followed by more sunshine, but substantially cooler temperatures by the evening, by which time the vegetation was very wet. The last of the rain was early in the evening. The night was dry, with a clear, starry sky and no moon. This meeting was a late addition to the BENHS field programme for 2009 and was promoted by phoning round locally-based members known to the leader and likely to be interested, because it was finalised after the paper version of the field meetings calendar was issued. It arose as an invitation from Michael New who is the voluntary warden for the site. As BENHS Field Meetings Secretary, the leader was keen to take up this offer and see the site, with a view to holding further field meetings there. The turn-out on the day was only four people, reduced from eight interested parties by the weather on the day, and a poor forecast, and also handicapped by the short notice, lesser promotion, and possibly also by the date coinciding with the start of the school holidays. However, it was the only date available to the leader. The four people in attendance comprised the leader, Michael New, the reserve manager Neil Pullen from the Wiltshire Wildlife Trust (WWT) and the recently appointed Wiltshire county moth recorder Marc Taylor, who succeeds John D'Arcy's many years of service in the post.

Sandpool Wiltshire Wildlife Trust Reserve is part of an extensive area of mainly open habitats which comprises the Cotswold Water Park and its surroundings. The

Sandpool reserve is on the western edge of the Park, near the villages of Oaksey and Kemble, and adjacent to Lower Moor Farm. It proved to be a particularly favourable site for mass light-trapping events, because lepidopterists can spread out well, encounter little light pollution from competing lights, and can overnight in a variety of on-site buildings such as observation hides for shelter, while the traps collect all-night samples. All in all an excellent venue for BENHS field meetings.

During the afternoon the site and its environs were inspected, taking shelter in various barns and in a series of bird observation hides, which have been newly built in the previous six months, while the rain showers passed over. Every time the rain stopped we were able to walk on in bright sunshine, with frequent rainbows. Essentially the Sandpool reserve and the surrounding land consists of treed hedgerows surrounding fields, some of which are long-established and undisturbed permanent grassland and hay meadows, such as on adjacent Clattinger Farm, which holds some of the most biologically rich and interesting neutral lowland grasslands in England. Adjoining fields have been excavated by surface mining for aggregates. In some cases they have then been flooded to create lakes for fish and wildfowl. In other cases, as at Sandpool, much of the excavations have been used for land-fill sites, in this case with much dumping of builders' rubble and other material. However, the original field boundaries have been respected, leading to conservation of many old established features of the landscape, such as paths and tracks, with accompanying old hedges, trees and copses. These features may act as sources of wildlife for colonisation of the many newly planted hedges and other recently introduced features, such as wooded ponds.

The first insects the leader noted on arrival, which would have been apparent to any visitor, were the enormous numbers of damsel flies, mainly the azure damselfly *Coenagrion puella* (L.). These damsel flies were rising like thin blue neon bars from the edges of the fields anywhere near the ditches or lakes. This was matched by the numbers of meadow brown butterflies rising up from the grass sward at the rate of two or three each footfall in the old hay-meadows on Clattinger Farm. On this visit there were also numbers of gatekeeper butterflies fluttering around most of the hedgerows. A hobby flew scything across the open ruderal sward currently comprising the bulk of the Sandpool Reserve. The long-term aim of the Wiltshire Wildlife Trust is to turn this area into grassland on which to graze the conservation herd of cattle when they are not grazing for management purposes elsewhere. However, the Trust recognise the value of ruderal swards for plants and insects. Accordingly, part of the area is to be managed on a six year rotation, with thirds cut every two years. One of the aims of this field meeting was to operate light-traps in this ruderal habitat (see Fig. 1) to begin to identify any moth species making use of the warm micro-climate provided by bare earth and sparse swards, and the range of herbs, which included much black medick *Medicago lupulina*, clovers and other trefoils, willowherbs *Epilobium* spp., centaury *Centaurium* sp., and bedstraws *Galium* spp., as well as much taller forbs at the margins, such as hemp agrimony *Eupatorium cannabinum*, wild teasel and lesser burdock *Arctium minus*.

On arrival the leader immediately tried to find if the Six-belted Clearwing *Bembecia ichneumoniformis* (D. & S.) was present, by using a pheromone lure and sweeping, but none was seen. However, the weather was unsuitable for most of the time, due to rain and a blustery wind, and only borderline when the sun was out, so the moth may be there yet. The presence of a number of common blue butterflies indicated there were sufficient trefoils to support this butterfly, but it is not restricted to bird's-foot trefoil *Lotus corniculatus* like the clearwing appears to be, and there were only a few patches of the latter. Several small common toads, just 2cm in head

Fig. 1. Ruderal area, Sandpool WWT reserve, 19 July 2009.

and body length, were encountered whilst walking around in this sward. A painted lady *Vanessa cardui* (L.) butterfly flew by and visited various flowers for nectar. Two buzzards mewed from opposite sides of the field. Several moorhens, great crested grebe and mute swans were in view on the pool and the lake.

After the guided tour of the site and selection of sites for the light-traps, Michael and Neil set up and cooked a most welcome barbecue of pork chops and burgers with all the trimmings. There was plenty of time for us to rest before deploying the traps in time for dusk.

The leader operated two standard-pattern Robinson traps fitted with 125W MB/U bulbs and chokes from a generator. One was placed at SU 1114 93897 ($\pm$ 4m) near a footbridge over a stream which marks the border of North Wiltshire with the vice-county of East Gloucestershire. The banks of the stream supported a mixture of all the above tall forbs including several clumps of hemp agrimony, the larval food-plant of the Scarce Burnished Brass moth *Diachrysia chryson* (Esper) which the leader had successfully recorded the previous night at a BENHS event at Parsonage Moor in the Cothill Fens of Oxfordshire (reported separately). He was anxious to see if this moth might be on the Sandpool reserve as well. A second Robinson trap was placed in a more sheltered site, in the field corner about 100m distant, surrounded by tall forbs but with less hemp agrimony, and more woody plants, particularly various willows and sallows, ash, hazel and ivy. The third and final trap used this night was a 125W mv trap provided by Michael and this was stationed by the largest concentration of hemp agrimony on the reserve, consisting of four large stands and a few others, alongside naturalised *Buddleja,* growing along an open track with hedgerows and trees near the main entrance.

The air temperature as dusk fell was 14°C, falling to a minimum for the night of 10°C. The night was calm with a clear, starry sky, no moon and no rain. In the morning the bridge trap held a catch of 121 macro-moths of 29 species, of which the

most noteworthy features were the numbers of Poplar Hawk *Laothoe populi* (L.) (seven) from the willows, together with smaller numbers of other willow-dependent species including the Pebble Prominent *Notodonta ziczac* (L.), Pale Prominent *Pterostoma palpina* (Clerck), Herald *Scoliopteryx libatrix* (L.) and Poplar Grey *Acronicta megacephala* (D. & S.). There were two Lunar-spotted Pinion *Cosmia pyralina* (D. & S.) in the catch and a melanic Peppered Moth *Biston betularia* (L.) alongside two of the typical white form. Moths which favour hot ruderal swards included six Ruby Tiger *Phragmatobia fuliginosa* (L.) and nine Flame Shoulder *Ochropleura plecta* (L.), and there was one Large Elephant Hawk-moth *Deilephila elpenor* (L.), now very worn and at the end of its flight season, and a fine male Ghost moth *Hepialus humuli* (L.). The most numerous moths were the Uncertain *Hoplodrina alsines* (Brahm) (29), Common Rustic agg. *Mesapamea* agg. (19) and Dark Arches *Apamea monoglypha* (Hufn.) (11). Also worth mentioning was one Least Yellow Underwing *Noctua interjecta* (Hbn.), which has the habit of flying up and down hedgerows on hot sunny afternoons. There were only four Large Yellow Underwing *Noctua pronuba* (L.) in the catch, and four Dingy Footman *Eilema griseola* (Hbn.).

There was a Yellow-barred Brindle *Acasis viretata* (Hbn.) on the outside of the field corner trap when it was inspected and closed up at 06.00h, when the trap was in shade. It was still in shade an hour later when the catch was recorded but the Yellow-barred Brindle had gone. The total catch for this trap was 99 macro-moths of 31 species. There were notably fewer Poplar Hawk-moths (1) and Dark Arches (3), but otherwise the most numerous species were as in the above trap. Twelve species of macro-moth were recorded that were not seen in the stream-side trap, all as one or two individuals only, including Swallow Prominent *Pheosia tremula* (Clerck), Nut-tree Tussock *Colocasia coryli* (L.), Scalloped Oak *Crocallis elinguaria* (L.), Green Pug *Pasiphila rectangulata* (L.), all like the Yellow-barred Brindle dependent on woody larval foodplants growing in the hedgerow, and open ground species including the Straw Dot *Rivula sericealis* (Scop.), Knotgrass *Acronicta rumicis* (L.), Shuttle-shaped Dart *Agrotis puta* (Hbn.) and Triple-spotted Clay *Xestia ditrapezium* (D. & S.). This brought the total for the leader's two traps to 41 species of macro-moths

Meanwhile, Michael and Marc stayed until just after midnight with Michael's trap and recorded 29 species of macros, of which 16 species were additional to those found by the leader, making a total of 57 species of macro-moth for the night. Amongst the additional species were the Magpie *Abraxas grossulariata* (L.), Purple Thorn *Selenia tetralunaria* (Hufn.), V-Pug *Chloroclystis v-ata* (Haw.), White-spotted Pug *Eupithecia tripunctaria* (H.-S.), Willow Beauty *Peribatodes rhomboidaria* (D. & S.), Coxcomb Prominent *Ptilodon capucina* (L.) and Yellow-tail *Euproctis similis* (Fuess.). Unfortunately, no Scarce Burnished Brass was seen, despite ample quantities of the larval food-plant. However, that was just on one night and we suggest further sampling before concluding this particular nationally scarce moth is absent.

The leader would like to thank the Wiltshire Wildlife Trust for hosting this field meeting and particularly Michael New for suggesting it. He also thanks Michael and Neil for preparing the barbecue and Marc Taylor for joining us and collating the results into the county records and the National Moth Recording Scheme. The leader has included another field meeting at Sandpool in the 2010 field meetings programme, in the hope that the weather and attendance will be better and that interesting and useful entomological records will be made over a greater range of taxa. Various forms of ground preparation and management works have started since the meeting in 2009 and it will be particularly instructive to monitor their impact over the coming years.

ANNOUNCEMENT

ENTOMOLOGICAL HOLIDAYS IN TARN ET GARONNE, FRANCE

BENHS member, Jennifer Boncey, is kindly offering free use of her small twin-bedded cottage at Barrau, Haumont, Esparsac in the Midi-Pyrenees, southern France to members of the Society, in return for biological records from the site and its environs. The steeply wooded slopes and small family farms have meant that the property and some of the surrounding area are fairly untouched by modern farming standards. A rich variety of butterflies has been recorded and European turtle, wild boar, badgers and deer, snakes and bats are known to occur.

The property is situated in rolling countryside and comprises six hectares of relatively unimproved meadows, mature oak woodlands and wetland features. The cottage is situated near the main farmhouse but the back door opens onto a patio with views of the surrounding woodlands.

The cottage is listed in Sawdays "Special Places to Stay" Self-Catering guide (Midi Pyrenees/Barrau). There is one main room with two single beds, a galley kitchen, and tiny shower/WC room. Hot water is by gas immersion, and the stove is gas. Electrical supply is minimal being at the end of a line: for example no electric kettle or toaster. Cooked meals can be provided by neighbours subject to agreement and at least 3 days' notice. However the cottage now has 2mb broadband. There's no BBQ, no pool, no TV, and no light pollution. It is possible to drive from the Channel ports in a day. The site is part of CREN (Conservatoire Regionale des Espaces Naturels) and visitors can be introduced to local CREN staff for further advice. For more details visit the website *www.Haumont.com*

The arrangement is that:

1. visitors can use the cottage free of charge.
2. all bed and bath linen are provided.
3. visitors organise (and pay for) their own transport and meals.
4. the cottage should be handed back in a similar state of cleanliness.
5. voucher specimens only, no collecting.
6. at the end of their stay, specialists share their field notes (there is a file in the cottage with complete copies of all the other audits, for reference).

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Cover photograph: The apid *Andrena nigrospina* Thomson foraging on radish. (Photo: Rosemary Winnall).

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FIRST INCURSION OF *NIPPONORTHEZINELLA GUADALCANALIA* (HEMIPTERA: ORTHEZIIDAE) INTO BRITAIN, WITH A REVISED CHECKLIST AND KEY TO THE BRITISH ORTHEZIIDAE

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ABSTRACT

In August 2009, a large infestation consisting of tens of thousands of *Nipponorthezinella guadalcanalia* (Morrison) (Hemiptera: Ortheziidae) was found in composted bark around the roots of potted *Amomum* sp. plants and an *Alpinia* sp. plant at the Royal Botanic Gardens, Edinburgh, Scotland. All the plants had been imported as dry seeds, except one that was imported as a rhizome from South East Asia. This is the first incursion of this species into Britain. The biology and geographical distribution of *N. guadalcanalia* are reviewed. In addition, a revised key and annotated checklist of the nine species (five native and four non-established introductions) of ortheziid recorded in Britain are presented.

INTRODUCTION

In August 2009, a Scottish Government inspector was alerted to large numbers of insects on the surface of compost surrounding the roots of potted *Amomum* sp. plants at the Royal Botanic Garden, Edinburgh (RBGE), Scotland. A small sample of the insects was delivered to Science and Advice for Scottish Agriculture (SASA) and then forwarded to The Food and Environment Research Agency (FERA) for identification. The insects were identified as *Nipponorthezinella guadalcanalia* (Morrison) (Hemiptera: Ortheziidae). The sample (Fig. 1) contained more than 700 specimens of *N. guadalcanalia*, representing all female developmental stages, although most were adults with fully-formed ovisacs. This is the first record of this species in Britain and it also appears to be the first for Europe (it has not been listed in the European and Mediterranean Plant Protection Organisation (EPPO) non-compliance reports). This is perhaps surprising because, according to Dr. Kozár Ferenc (pers. comm., 2009) of the Plant Protection Institute, Hungary, who recently published a monograph on the Ortheziidae of the World, *N. guadalcanalia* is one of the most commonly transported soil-inhabiting coccoids in the World. It is frequently moved with plants, moss and soil.

Further investigation found that the compost in four pots ranging in volume from 15 to 30 litres containing many *Amomum* sp. plants and one *Alpinia* sp. plant, kept at 18–25°C in humid conditions, were infested with the ortheziid. The RBGE staff first noticed the insects during 2008 after the plants were treated with the contact and systemic insecticide acetamiprid (Gazelle), which appeared to bring the insects to the surface of the compost. The small (<2.0 mm) white insects were initially mistaken for vermiculite or fungus until the staff noticed their movement. The scale insects were observed crawling slowly across the gravel between the pots on a 2 m wide portion of bench. The majority of the insects, whose numbers were in the tens or possibly hundreds of thousands, were found in a pot containing *Amomum* plants grown from seed imported from Sumatra, Indonesia, in February 2004. All the plants associated with the insects were imported as seed from South East Asia, except

for one *Amomum* sp., which was imported as a rhizome from Luzon, Philippines. Seeds are imported dry and usually refrigerated upon arrival at the gardens (refrigeration was found to quickly kill the ortheziids in the initial sample sent to FERA). All of the plants affected are *Amomum* sp. except for one *Alpinia* sp., which also originated from South East Asia. The pathway of introduction to the RBGE is not known for certain but it is suspected they they came with plant material from South East Asia and it seems most probable that they were introduced with the rhizome rather than with the seeds (especially as the latter were refrigerated on arrival). The compost used at the RBGE is mixed on site and consists of vermiculite, perlite, pine bark, spruce bark and charcoal.

The affected plants have been treated with the systemic insecticide imidacloprid (Intercept) to control the insects.

The purpose of this communication is to report the first incursion of *N. guadalcanalia* into Britain and to review its geographical distribution and biology. In addition, an annotated checklist of the nine species (five native and four non-established) of ortheziids recorded in Britain and a revised key to their identification are presented.

Nipponorthezia guadalcanalia was originally described by Morrison (1952) from a single specimen preserved in alcohol collected by L. Liporsky from North Guadalcanal, Solomon Islands, in November 1933. The same species was subsequently described by Richard (1979) under the name *Nipponorthezia mameti* from specimens collected in leaf litter from Mt Limon, Rodrigues Island, on the 9 May 1972 by M. Y. Gomy. Kozár (2004) erected a new genus *Nipponorthezinella* with *guadalcanalia* as the type species. Currently *N. hirsuta* Konczné Benedicty & Kozár is the only other species assigned to *Nipponorthezinella*.

Detection and identification

The Ortheziidae, commonly known as ensign scales, are probably the most easily recognizable of all the scale insect (Coccoidea) families, as the bodies of the adult females are adorned with distinct dorsal and/or marginal wax plates giving an ornate appearance.

Adult female *N. guadalcanalia* are oval (Fig. 2), 1.4–1.9 mm long and 1.0 mm wide. In life, they are orange-brown and have marginal wax plates that curve backwards and a mid-dorsal longitudinal ridge of wax; the legs and antennae are relatively large and dark. The mature females carry a wax ovisac that may extend posteriorly up to 2.5 mm in length. Detailed morphological descriptions and illustrations of adult females are given by Williams & Watson (1990) and Kozár (2004). The nine species of ortheziid that have been detected in Britain (see Appendix 1) may be separated with the key below. Further keys are available to the ortheziids of the World (Kozár, 2004), central Europe (Kosztarab & Kozár, 1988), Pacific region (Williams & Watson, 1990), Australia (Lapolla *et al.*, 2008), North-eastern North America (Kosztarab, 1996) and southern USA (Miller, 2005).

Pictures showing the general morphology of an adult female ortheziid are readily available in the literature listed above and at the time of publication several of these were freely available on the internet, for example: Miller (2005) http://www.bioone.org/doi/pdf/10.1653/0015-4040(2005)88%5B482%3ASSIGHC%5D2.0.CO%3B2

Detailed morphological descriptions and illustrations to all the species detected in Britain are provided by Kozár (2004).

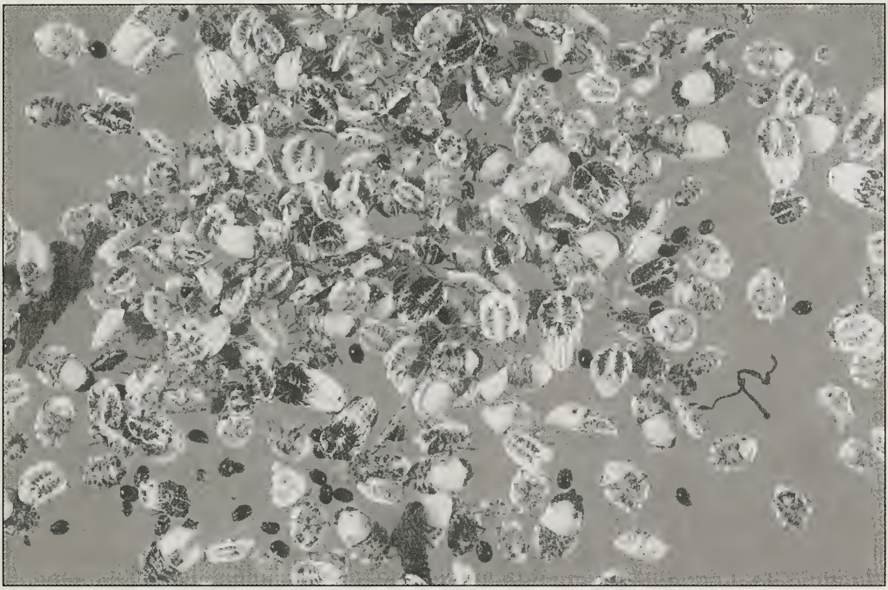

Fig. 1. *Nipponorthezinella guadalcanalia* found in compost.

Fig. 2. Two adult female *Nipponorthezinella guadalcanalia*, one (left) with an ovisac.

Key to adult female ortheziids recorded in Britain

1. Tibia and tarsus divided (examine all legs as occasionally one or two legs have tibia and tarsus that appear partially fused) 2
– Tibia and tarsus fused 5
2. Tarsal claws without denticle (small tooth on the plantar surface of the claw); with 3 more or less distinct triangular clusters of spines arranged longitudinally in mid-dorsal area of thorax (difficult to see if the cuticle is folded or distorted), these clusters produce three small wax plates that are distinctive in life . . . . *Arctorthezia cataphracta* (Olafsen)
– Tarsal claws with denticle; without 3 triangular clusters of spines in mid-dorsal area of thorax 3
3. With rows of setae inside ovisac band 4
– Without rows of setae inside ovisac band. . . . *Insignorthezia insignis* (Browne)
4. With 8 pairs of abdominal spiracles. . . . . *Orthezia urticae* Linnaeus
– With 4 pairs of abdominal spiracles. . . . *Graminorthezia tillandsiae* (Morrison)
5. First antennal segment conspicuously enlarged and elongate . . . . *Newsteadia floccosa* (De Geer)
– First antennal segment short, not conspicuously enlarged and elongate. 6
6. Antenna 3 segmented. 7
– Antenna with more than 3 segments 8
7. A continuous transverse band of dorsal spines present behind the median cluster of spines on the head . . . . *Ortheziola vejdovskyi* Šulç
– A small, indistinct group of spines present on each side behind the median cluster of spines on the head. . . . . *Ortheziola britannica* Kozár & Miller
8. Setae on antennae and legs long with flagellate apices. . . . . *Nipponorthezinella guadalcanalia* (Morrison)
– Setae on antennae and legs spine-like with acute apices. . . . . *Nipponorthezia ardisae* (Kuwana)

Host range and biology

Nipponorthezinella guadalcanalia is most frequently collected from leaf litter, in many cases using Berlese funnels (Richard, 1979; Williams & Butcher, 1987; Williams & Watson, 1990; Kozár, 2004). Beardsley (1966a) speculated that it was a root feeder. As well as being recorded in leaf litter, it has also been recorded from moss, leaf mould, rainforest litter (containing *Agathis* sp. (Araucariaceae) and *Calophyllum* sp. (Clusiaceae)), soil samples and pit-fall traps (Williams & Watson, 1990). More recently, it has been recorded from *Alpinia purpurata* (Zingiberaceae) and *Gardenia* sp. (Rubiaceae) (Heu, 2002), and from *Alpinia* sp. and *Amomum* sp. (Zingiberaceae) (in this publication).

The biology of *N. guadalcanalia* has not been studied. Female ortheziids develop through four instars and males through five. Only females were found in the large samples of *N. guadalcanalia* collected in Scotland and the males are either seasonal, only occur under specific environmental conditions or *N. guadalcanalia* may be able to reproduce parthenogenetically. All female developmental stages were present in the samples, which indicates that it has more than one generation a year and could breed continuously if environmental conditions were suitable. Some adults and nymphs survived in the absence of any living plant material on which to feed for up to three weeks in Petri dishes in an incubator at about 21°C with damp compost. Each egg case was found to contain only two or three comparatively large oval eggs (302–380 μm in length, 232–264 μm in width), which were cream coloured at first but darkened to a reddish-brown colour with maturity. There were no signs of parasitism.

Geographical distribution

Nipponorthezinella guadalcanalia occurs widely in the Pacific region and was supposedly spread accidentally in the soil of seedlings such as tea and coffee (Kozár, 2004). It is recorded here in association with plants imported from South East Asia, including Indonesia and the Phillipines, although it has not been collected in that region. Williams & Watson (1990), however, suggested that it might occur in South East Asia.

Afrotropical: Reunion (Richard, 1979); Rodriques Island (Richard, 1979).

Australasian: Australia (Williams, 1991); Cook Islands (Williams & Watson, 1990); Federated States of Micronesia (Beardsley, 1966a); Hawaiian Islands (Beardsley, 1966b, 1979; Nakahara, 1981; Heu, 2002); New Caledonia (Williams & Watson, 1990); Niue (Williams & Watson, 1990); Palau (Beardsley, 1966a); Papua New Guinea (Williams & Watson, 1990); Solomon Islands (Morrison, 1952); Tonga (Williams & Watson, 1990); Vanuatu (Williams & Butcher, 1987).

Economic importance

There are only a few species of ortheziid that are economically important worldwide, the most notable being *Insignorthezia insignis* (Browne), commonly known as the Kew bug or glasshouse ensign scale (Kozár, 2004). This species is a serious pest of many herbaceous and woody plants but is restricted to indoor plantings in cooler temperate regions.

There is no indication in the literature that *N. guadalcanalia* is economically important but it does appear to be a successful coloniser, for example, having been introduced to Australia, Hawaii and Scotland. It appears to have the potential to establish in indoor botanical collections in Europe, just as the ortheziids *I. insignis* and *Graminorthezia tillandsiae* Morrison (Voigt, 2000) have done.

Conclusion

This is the first published record of *N. guadalcanalia* in Europe. The biology of this species is largely unknown but it has been found in leaf litter and soil associated with plants belonging to at least four families (Araucariaceae, Clusiaceae, Rubiaceae and Zingiberaceae). It is a tropical species that is unlikely to be able to naturalise in the UK but could breed in botanical collections, at least temporarily. It is a successful coloniser, which is why it is so widespread in the South Pacific, and has been introduced to Australia and Hawaii.

Acknowledgements

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Appendix 1. A checklist of Ortheziidae of Britain

The checklist of British Ortheziidae by Boratynski & Williams (1964) includes four native and one introduced species established on indoor plantings. Since it was published, however, several changes have occurred. For example, one new native species has been described from Britain, one species has changed generic placement, one introduced species previously considered established is no longer present and incursions of three additional non-native species have occurred. Miller *et al.* (2005) provide a checklist for the Ortheziidae of the World.

The present list has been divided into native species and non-established introductions, to make it clear which species are actually present in the UK.

Ortheziidae

Native species

ARCTORTHEZIA Cockerell, 1902
Type species *Orthezia occidentalis*, by subsequent designation (Cockerell, 1902)
POLYOCELLARIA Imhof, 1900, nomen nudum
cataphracta (Olafsen, 1772 *Pediculus*)
chiton (Zetterstedt, 1840 *Dorthesia*) [Syn. by Morrison, 1925]
signoreti (White, 1877 *Orthezia*) [Syn. by Morrison, 1925]

NEWSTEADIA Green, 1902
Type species *Coccus floccosus* De Geer, by monotypy and original designation
TRANSNEWSTEADIA Richard, 1990 [Syn. by Kozár & Konczné Benedicty, 2000]
floccosa (De Geer, 1778 – *Coccus*)
uva (Modeer, 1778 – *Coccus*) [Syn. by Giard, 1898]
normani (Douglas, 1881 – *Orthezia*) [Syn. by Giard, 1898]
collarti Ghesquière, 1933, nomen nudum
collarti Ghesquière, 1934 [Syn. by Ghesquière, 1947]

ORTHEZIA Bosc d'Antic, 1784
Type species *Orthezia characias* Bosc (= *Orthezia urticae* Linnaeus), by monotypy
DORTHEZIA d'Orthez, 1785 [Syn. by Morrison, 1925]
CIONOPS Leach, 1815 [Syn. by Morrison, 1925]
CYPHOMA Gistel, 1848 [Syn. by Morrison, 1925]
DOUGLASIA MacGillivray, 1921, preocc. [Syn. by Morrison, 1925]
DOUGLARIELLA MacGillivray, 1921, replacement name

urticae (Linnaeus, 1758 *Aphis*)
characias Bosc d'Antic, 1784 [Syn. by Signoret, 1876]
dubius (Fabricius, 1794 *Coccus*) [Syn. by Dufour, 1833]
delavauxii (Thiebaut, 1825 *Dorthezia*) [Syn. by Lindinger, 1912]
glechomae (Burmeister, 1835 *Coccus*), nomen nudum
dispar (Kaltenbach, 1874 *Dorthezia*), nomen nudum
maenariensis Douglas, 1884 [Syn. by Laing, 1922]
martelli Leonardi, 1908 [Syn. by Morrison, 1925]
arenariae Vayssière, 1924 [Syn. by Morrison, 1952]

ORTHEZIOLA Šulç, 1894
Type species *Ortheziola vejdovskyi* Šulç, by monotypy
britannica Kozár & Miller, 2000.
britannica Kozár & Konczné Benedicty, 1999, nomen nudum
vejdovskyi Šulç, 1895
signoreti (Haller, 1880 *Orthezia*), preocc.

Non-established introductions

GRAMINORTHEZIA Kozár, 2004
Type species: *Orthezia graminis* Tinsley, by original designation
tillandsiae (Morrison, 1925 *Orthezia*). Note 1.

INSIGNORTHEZIA Kozár, 2004
Type species: *Orthezia insignis* Browne, by original designation
insignis (Browne, 1887 *Orthezia*). Note 2.
nacrea Buckton, 1894 [Syn. by Green, 1895a]
costis Ghesquière, 1933, nomen nudum

NIPPONORTHEZIA Kuwana, 1916
Type species: *Nipponorthezia ardisiae* Kuwana, by monotypy
ardisiae Kuwana, 1916. Note 3.

NIPPONORTHEZINELLA Kozár, 2004
Type species: *Nipponorthezinella guadalcanalia* Morrison, by original designation
guadalcanalia (Morrison, 1952 *Nipponorthezia*). Note 4.
mameti (Richard, 1979 *Nipponorthezia*) [Syn. by Williams & Watson, 1990]

Notes

1. *Graminorthezia tillandsiae*, commonly known as the 'Spanish moss orthezia', has been found at a single commercial nursery in England on *Tillandsia* plants imported from Guatemala, June 1999 and July 2003 (FERA unpubl. records). It is established in a botanical garden in Germany (Voigt, 2000).
2. *Insignorthezia insignis* is a polyphagous pest of a wide range of woody and herbaceous plants. It is recorded as being present in the UK in numerous publications and transient populations have been found on indoor plantings in many botanical gardens and commercial nurseries. It is not currently known to be established anywhere in the UK.
3. *Nipponorthezia ardisiae*, found at a single commercial nursery in England on a *Taxus* bonsai plant imported from Japan, May 1996 (FERA unpubl. record).
4. Recorded here.

SPHRAGISTICUS STÅL (HETEROPTERA: LYGAEIDAE) – A RECENTLY ESTABLISHED BRITISH SEED BUG GENUS

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Abstract

The seed bug *Sphragisticus nebulosus* (Fallén), a species associated with disturbed ruderal areas and cultivated field margins, is recorded for the first time from Britain and its current distribution described. Diagnostic characters of adult and immature *Sphragisticus* are discussed in relation to other British Rhyparochrominae.

Introduction

The seed bug genus *Sphragisticus* is monotypic. Its only member, *Sphragisticus nebulosus* (Fallén) (Plate 5, Fig. 1), is a species of dry, incompletely vegetated ground and has a wide North Holarctic distribution (Péricart, 1998). It is probably an introduced species to the Nearctic, although it is conceivable that it may have spread naturally in late Pleistocene times (Sweet, 1964). The biology of this species was described by Sweet (1964) who associated it with disturbed ruderal areas and cultivated field margins, noting that it is rarely found for more than two years in fallow fields, except along edges maintained by cultivation.

The first British records for *Sphragisticus* in 1997 suggest it is extending its range in North-West Europe. The records are described below together with a diagnosis of adult and immature characters.

First British records of *S. nebulosus*

Four adults of *Sphragisticus nebulosus* (Fallén) were collected by C. Plant for the first time in Britain, from Lakenheath Fen RSPB Reserve, Suffolk (TL695855). They were identified by P. Kirby from samples collected from two separate pitfall trap stations, both set in sand lenses in 35 hectares of arable weeds in July and August 1997 (Plant, 2000). The specimens were recorded as part of an RSPB baseline monitoring programme of 242 hectares including 190 hectares of arable land, purchased in 1995 with Heritage Lottery Funding for the creation of new wetland communities.

During a brief two hour visit to the RSPB Reserve, by S. Judd on 20 July 2000, a further three adults and four nymphs were recorded from under a spreading mat of a dead ruderal herb (possibly a chickweed species) at the base of a recently landscaped embankment. This was in the same geographical position as the original pitfall trapped specimens but in a completely modified habit. The seed bug was not found again at this location, during a full site survey between 22 and 23 August 2000 of all major areas of exposed sand containing scattered ruderal vegetation. It was, however, found in reasonable numbers three kilometres east of Hockwold cum Wilton (TL765881) some five miles distant from the original discovery location. At this locality, adults and nymphs were under ribwort plantain *Plantago lanceolata* at the edge of a ten metre wide sandy field margin, divided from a weedy carrot crop by an irregularly used, seven metre wide sandy access track.

Most recently, *Sphragisticus* has been recorded some 12 years later by S. Judd, four miles south-west of Thetford (TL823776). Adults and late instar nymphs were present among a small patch of scattered ruderal vegetation within an eight metre wide, sandy onion field margin (Fig. 1). Plants present included common nettle *Urtica dioica*, common storks-bill *Erodium cicutarium*, orache *Atriplex* sp, ribwort

plantain *Plantago lanceolata*, mugwort *Artemisia vulgaris*, bugloss *Anchusa arvensis*, knotgrass *Polygonum* agg., ivy-leaved speedwell *Veronica hederifolia*, and thyme-leaved sandwort *Arenaria serpyllifolia*. This was the only find during an intensive 15 hour search for the species on 4–5 July 2009 in sandy, ruderal field margins, across nine 10-kilometre squares throughout the Norfolk and Suffolk Breckland (TL77, 78, 79, 87, 88, 89, 97, 98, 99).

In the intervening years, there have been two other records for *Sphragisticus*, both from the same location, at Icklingham (TL768736). On 13 September 2003, B. S. Nau found a single male in a fallow field which was mainly bare but with scattered ruderal plants. Two years later, a single specimen was recorded on 30 April 2005 by S. E. Brooke amongst small open patches of loose sand amongst grasses.

Habitats across the Norfolk and Suffolk Breckland have been regularly visited by field entomologists since the late 19th Century and it is unlikely that *Sphragisticus*, which is a relatively distinctive seedbug, would have been overlooked. The species is a recently established addition to the British insect fauna and has been recorded from four locations across four 10 km squares over the last twelve years (Fig. 2). It is highly probable that other populations will occur elsewhere in suitable Breckland habitat. It will be interesting to monitor whether this species remains restricted to this region or whether it becomes more widely distributed across the country.

Voucher specimens are stored in perpetuity by National Museums Liverpool.

Diagnosis

Adult *Sphragisticus* (Plate 5, Fig. 1) are ca. 4.5 mm–5.6 mm long, mottled brown and black in colour and camouflage well against light sandy-grained soils. The head, abdomen and appendages are predominantly black but normally with some dark yellow on antennal segments 2 and 3 and on the tibiae, especially the fore tibiae. It is typical of the subfamily Rhyparochrominae in that the abdominal suture between sterna 4 and 5 curves forward laterally and does not reach the lateral abdominal

Fig. 1. Typical *Sphragisticus* habitat – ruderal vegetation at the margin of an onion field near Thetford.

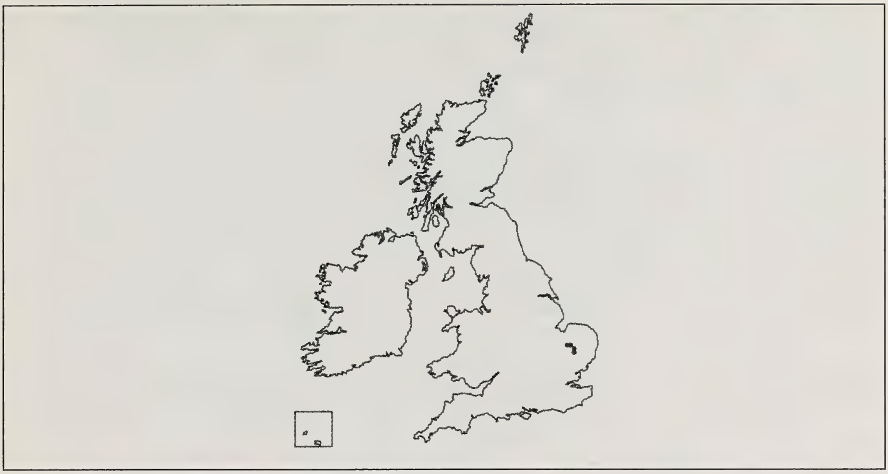

Fig. 2. UK distribution of *Sphragisticus nebulosus*.

margin. Together with *Megalonotus*, it is the only British representaive of the Megalonotini and separated from all of the other Rhyparochrominae tribes, apart from Rhyparochromini, by the presence of spiracles on dorsal abdominal segments 3 and 4.

Sphragisticus adults are easily separated from the six British *Megalonotus* species and 11 species in six British Rhyparochromini genera (*Beosus*, *Graptopeltus*, *Peritrechus*, *Raglius*, *Rhyparochromus* and *Xanthochilus*) by the presence of 5–7, very distinct, long, erect, black hairs which arise from dark spots on the yellow, explanate, lateral margins of the pronotum (Plate 5, Fig. 2) and which contrast with the short, adpressed, lighter pilosity of the rest of the pronotum and wings. In the field, they might be superficially mistaken for *Peritrechus* species.

Sphragisticus nymphs have the same distinguishing suture and spiracle pattern as the adult. They are shiny, suboval with a dark, heavily sclerotized red abdomen, darker brown-black head, pronotum and wing pads and yellow-brown appendages (Plate 5, Fig. 3). Interestingly, it is a nymphal character that delineates Megalonotini from Rhyparochromini. Megalonotini nymphs have a simple, un-branching suture between terga 3 and 4 whilst Rhyparochromini have a wide, troughed 'Y-suture' between terga 3 and 4 which branches near the abdominal margin.

The characteristic lateral pronotal hairs of adult *Sphragisticus* are present in the nymph but do not arise from dark spots. They are equally as long and erect as in the adult but are less distinct because the whole upper body of the nymph is sparsely covered in similar hairs together with shorter, denser, semi-erect hairs.

The distribution, shape and size of the black evaporative areas, which surround the paired dorsal abdominal gland apertures and are clearly visible along the abdominal midline in Plate 5, Figure 3, can be used to separate Megalonotini nymphs in Britain. *Sphragisticus* nymphs have three distinctive evaporative areas between terga 3–4, 4–5 and 5–6 and are the only Megalonotini in Britain to have the anterior evaporative area larger and wider than the other two which are almost equal in size (the posterior one is marginally smaller and less wide than the intermediate). In contrast, the evaporative area between terga 3 and 4 is absent in *M. dilatatus* (H.-S.) and *M. antennatus* (Schill.) with *M. dilatatus* also only having a vestigial evaporative area between terga 4 and 5. The posterior evaporative area is larger and wider in *M. praetextatus* (H.-S.) than the

intermediate and anterior area and the anterior area is the narrowest. The posterior evaporative area is wider than the intermediate and anterior evaporative areas in *M. chiragra* (Fabr.), *M. emarginatus* (Rey) and *M. sabulicola* Thomson with the intermediate area the smallest.

Acknowledgements

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BOOK REVIEW

New Flora of the British Isles by Clive Stace. Third Edition. 1272pp. (Cambridge University Press, 2010). Soft cover £50.00. ISBN 978-0-521-70772-5.

It may seem a bit unusual to review a botanical book in an entomological journal, but a few members of our Society remain attached to our full title of British Entomological and Natural History Society, so that book reviews on non-entomological subjects are entirely permitted. Of course as we know good entomologists have to acquire expertise in identifying plants often as a way of confirming the identity of an insect whereas the reverse is rarely the case.

Since its first publication in 1991, the New Flora of the British Isles has become the standard reference work on the identification of wild vascular plants in the British Isles. It essentially replaces the old familiar 'CTW', which though providing lengthier descriptions and crammed with lots of useful biological information, covered far fewer species with long out-of-date distributional data.

The new edition of Stace includes the addition of more than 160 species, so that 4,800 taxa are now covered in varying degrees of detail. The most important change and the reason for bringing the book's attention to entomologists is that it incorporates the latest molecular system of plant classification based on DNA sequencing. Some familiar generic names have therefore been sunk or merged or even moved to new families, so that the order of species, relating to a presumed phylogeny, has been significantly re-arranged.

The distributional information and designations of conservation status for each species have been completely overhauled in the light of recent national surveys. So, this is *the* botanical companion for 21st century entomologists.

It is pleasing to note that three of our entomologist members, Trevor James, Steven Falk and Eric Philp have recently written county floras. However I should hasten to add that Clive Stace has always had an abiding interest in entomology and in the past contributed specimens to Michael Chalmers-Hunt's Lepidoptera collection.

JOHN BADMIN

THE BEE AND WASP ASSEMBLAGES (HYMENOPTERA: ACULEATA) OF SOME KEY HEATHLAND SITES IN THE WEST MIDLANDS REGION

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Abstract

A description of the modern bee and wasp assemblages of seven heathlands in the British West Midlands region at the end of the twentieth century is given with an indication of historic losses and recent gains. The characteristics of the various habitats that are typically present at such sites and the way that these are utilised by bees and wasps are discussed.

Introduction

Despite the ravages of agricultural improvement and the substantial growth of towns and cities within the British West Midlands Region (*sensu* modern Herefordshire, Worcestershire, Warwickshire, Staffordshire, Shropshire and the unitary districts such as Birmingham and Wolverhampton that formed the former West Midlands County), patches of lowland heathland still remain. However, huge losses have been incurred (90% in Staffordshire over the past 200 years according to DEFRA, 2003) and with the exception of Cannock Chase the remaining sites are mostly small and isolated. Today, the Region supports approximately 3000 hectares of 'heathland' (DEFRA, *loc. cit.*) of which nearly 2000 hectares fall within modern Staffordshire, 500 hectares in the former West Midlands County, 108 hectares in modern Worcestershire, and the remainder in Herefordshire, Shropshire and Warwickshire. The precise definition of heathland used by the various sources varies from ericaceous dwarf-shrub communities in the strictest sense to the larger mosaics of heathers, scrub, bracken and grassland that often occur in association. Smaller patches of heather can also be found elsewhere within acid grassland, woodland rides and post-industrial sites, especially in areas with base-poor geology that historically supported heaths and commons (often reflected by place-names containing 'Heath' e.g. Short Heath in Birmingham), though these small patches rarely support heathland insects.

West Midlands heaths have attracted entomologists for well over a century, as revealed in the relevant chapters of Victoria County Histories e.g. Martineau (1904) for Warwickshire and Jourdain (1908) for Staffordshire. However, few detailed surveys of bees and wasps at these sites have taken place until the late twentieth century and the fauna has traditionally been much less understood than that of southern counties such as Dorset, Hampshire and Surrey, or that of East Anglia. Since 1990 the author and a number of workers including Dr Michael Archer, Jon Webb and Andy Jukes have made repeat visits to various sites of known or potential value and a number of papers and technical reports have already been produced (Falk *et al.*, 1996; Falk & Lane 1999; Archer, 2002, 2004, 2006: Falk & Webb, 2002; Jukes, 2004). This paper collates these published and unpublished data and attempts to provide a better understanding of the contribution that heathland in this part of Britain makes to our bee and wasp fauna.

Methods

Survey sites

Seven sites were surveyed:

(i) Baddesley Common, north Warwickshire (SP274978) (Fig. 1) – a tiny heathland of a few hectares, studied by the author on several dates in 1995.

(ii) Barlaston/Rough Close Common, north Staffordshire (SJ925395) – a medium-sized (approximately 21 ha) mosaic of dry heathland, wet heathland, bracken and woodland containing a small sand quarry. Studied by the author on several dates in 1994 and 1995.

(iii) Devil's Spittleful SSSI, Worcestershire (SE8270) – a 60 ha site with much sandy heathland, studied by Dr Archer on numerous dates between 1990 and 1997.

(iv) Gentleshaw Common SSSI, mid Staffordshire (SK050113) (Fig. 2) – an 80 ha site near Chase Terrace supporting both dry and wet heathland, and also containing a sandstone quarry. Studied by the author on four dates in 1994/95, with subsequent visits by Dr Archer and A. Jukes up to 2006.

(v) Hartlebury Common SSSI, Worcestershire (SO823706) – an 87.5 ha site with much dry sandy heathland, studied by Dr Archer between 1990 and 1997.

(vi) Highgate Common Country Park, south Staffordshire (SO838899) (Fig. 3) – a 94 ha mosaic of dry heathland, acid grassland and woodland. Studied by the author, Dr Archer, A. Jukes and J. Webb on numerous dates between 1996 and 2006.

(vii) Sutton Park National Nature Reserve, north Birmingham (SP1096) (Fig. 4) – a 989 ha mosaic of dry heathland, acid grassland, wet heathland and mire, carr and woodland. Studied by the author on numerous dates in 1996 and 1997.

Survey methodology

The nature of the surveys varied between the recorders. Much of it took the form of inventories that attempted to produce good species lists. Some visits, such as those of Dr Archer, concentrated purely on bees and wasps, whilst many of the author's visits also covered Diptera, Odonata and butterflies, which influenced they way in which bees and wasps were sampled (with a heavy emphasis on sweeping). The author's inventory surveys were also structured to produce separate species lists for various vegetation zones and microhabitats within the study sites e.g. bare sand, heather stands, acid grassland, wet heath, bracken, gorse stands and flowery, shrubby heathland 'verge'. By contrast, work carried out by the author at Highgate Common between 2000 and 2002 was mostly autecological in nature, concentrating on observing the way in which the scarcer species were using the site.

In all surveys, special attention was paid to both nesting and foraging areas. Examination of sandy footpaths and any sand faces across a range of dates revealed many of the fossorial species present and provided an indication of population strengths. Key forage plants were checked at the peak of their flowering, including heathers *Calluna vulgaris* and *Erica* species, bilberry *Vaccinium myrtillus*, cat's-ear *Hypochaeris radicata*, mouse-ear hawkweed *Pilosella officinarum*, grey willow *Salix cinerea*, wild cherry *Prunus avium*, blackthorn *Prunus spinosa*, hawthorn *Crataegus monogyna*, umbellifers such as hogweed *Heracleum sphondylium*, brambles, thistles *Carduus* and *Cirsium* species, common knapweed *Centaurea nigra*, common ragwort *Senecio jacobaea*, common bird's-foot trefoil *Lotus corniculatus*, vetches *Vicia* species and harebell *Campanula rotundifolia*. For genera such as *Sphecodes*, *Lasioglossum*,

Fig. 1. Baddesley Common, Warwickshire, a small areas of heathland with a limited fauna of bees and wasps.

Fig. 2. Gentleshaw Common, north Staffordshire – one of several sites with an old sandstone quarry which is much exploited by fossorial species.

Fig. 3. Highgate Common, south Staffordshire – the most exceptional of the sites with a list of 130 bees and wasps.

Fig. 4. Sutton Park, north Birmingham – a large suburban heathland with wet and dry heath, of moderate value for bees and wasps.

PLATE 5

1: Adult male *Sphragisticus nebulosus*. 2: Characteristic long spines on lateral edge of pronotum. 3: Fifth instar *Sphragisticus* nymph. 4: *Philanthus triangulum* with honey bee prey beneath – one of several aculeates that have arrived at West Midlands heaths in recent years. 5: *Ammophila pubescens* with caterpillar – a true heathland specialist requiring heather as a source for its prey. 6: *Andrena nigrospina* foraging on radish – an endangered bee nesting at Highgate Common but probably foraging over a much wider area (photo: Rosemary Winnall).

Crossocerus, *Diodontus* and smaller *Andrena* care was taken to obtain reasonable samples, as several species that are indistinguishable in the field can be present.

Prolonged sweeping using a long-handled insect net was employed by the author and proved to be one of the most efficient sampling methods over mixed nesting colonies and flower-rich habitats. It was also particularly effective for obtaining pompilids, small crabronids such as *Harpactus tumidus* (Panzer) and *Nysson dimidiatus* Jurine and also the tiphiid *Tiphia minuta* Vander Linden in short or sparse vegetation, as these can be time-consuming insects to capture individually and are not always easily spotted in the field. Visits by the author (also covering Diptera) generally lasted for 5–6 hours and every effort was made to exploit reasonably warm and sunny weather as overcast or wet conditions severely affect the activity of bees and wasps. Visits by Dr Archer lasted from 2–3 hours and involved use of a short-handled kite net.

The data have been analysed in a number of ways. The presence of Red Data Book, Nationally Scarce and Regionally Scarce species has been used to obtain a standard rarity score for each site by assigning points to the various rarity gradings as follows: 100 points to Red Data Book species, 50 points to Nationally Scarce species and 20 points to Regionally Scarce species (following Ball, 1986). The rarity gradings for Red Data Book and Nationally Scarce species were taken from Falk (1991) but some have been adjusted to allow for the fact that some gradings are now known to be strongly misleading, either due to species increasing their range and frequency in recent decades, or because they were under-recorded in the past (within the Appendix an asterix has been placed against the obviously misgraded species and a bracketed regrade suggestion that is more realistic given afterwards). Rarity scores quoted in Table 1 are based on these adjusted grades. Regional scarcity (*sensu* West Midlands) was assessed using the national atlases published by the Bee, Wasp and Ant Recording Society (e.g. Edwards 1997 & 1998, Edwards & Telfer, 2001 & 2002), also personal data including the official dataset for Warwickshire bees and wasps, the on-line Staffordshire checklist (available at *www.staffs-ecology.org.uk*). Dr Archer has also worked out a species quality score (here termed the Archer species quality score) that he has developed using the distributions and frequencies of different species in the same national atlases (see Archer, 1995 for methodology).

An effort was also made to assess the quality and characteristics of the bee and wasp assemblages at these sites by examining the presence of key indicator species. The categories used were:

- **Species with a strong or obligate requirement for heathers** (marked 'Er' in the Appendix) e.g. *Andrena argentata* Smith, *A. fuscipes* (Kirby), *Colletes succinctus* (L.) and the cleptoparasite *Epeolus cruciger* (Panzer), the last because it seems to be entirely parasitic upon *C. succinctus* in the West Midlands.
- **Other species strongly associated with heathland or acid grassland in the West Midlands** i.e. 'heathland-loving' even if they do not specifically require heathers (marked as 'HL' in the Appendix). Not all of these species are so strongly associated with heathland and acid grassland in other parts of Britain (*Andrena humilis* Imhoff for example regularly occurs in chalk grassland on the South Downs).
- **Coastal-biased species**, a special sub-group of the last category for four species that typically occur on dunes, but can colonise inland on sites with particularly loose sands, namely *Dasypoda hirtipes* (Fabr.), *Megachile maritima* (Kirby), *Oxybelus argentatus* Curtis and *Podalonia affinis* (Kirby). Their presence inland can be considered a special attribute of a site in the same way as a comparable plant population might be viewed.

Table 1. The number of scarcer species of bee and wasp found at each of the seven sites, rarity scores and Archer species quality scores

	Baddesley Common	Barlaston/ Rough Close	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park NNR
Total no. of species	57	52	122	112	100	130	92
Red Data Book species	0	0	0	1	1	5	0
Nationally Scarce species	2	2	15	8	12	12	2
Regionally Scarce species	8	2	31	18	32	29	18
Standard rarity score	260	140	1370	860	1340	1680	460
Archer species quality score	2.1	1.4	2.5	2.3	2.9	3.0	2.1

Results

Two hundred and sixteen species of bee and wasp (excluding *Apis mellifera* L.) were recorded with certainty from the seven sites in the West Midlands and are listed in the Appendix (see Plate 5, Figs 4–6 for notable examples). This is not considered a definitive list, and the recording of certain cleptoparasitic bees and wasps (e.g. *Sphecodes rubicundus* Hagens and *Nysson dimidiatus*) at sites without finding their hosts indicated that a level of under-recording still remained at the end of the surveys. The richest site proved to be Highgate Common with 130 species (Table 1). This is currently the longest bee and wasp list for any West Midlands site. Baddesley Common and Barleston/Rough Close Common were the poorest by some margin. The totals for all sites are given in Table 1.

Many rare and scarce species were encountered. Adjusted for misgrading, this included six reasonably valid Red Data Book species, 26 Nationally Scarce species and 48 Regionally Scarce species. These species are highlighted in the appendix and the total number recorded at each site, plus the rarity score derived from these is shown in Table 1. Species new to the Staffordshire list included *Diodontus insidiosus* Spooner, *Dolichovespula saxonica* (Fabr.), *Lasioglossum brevicorne* (Schenck), *Nysson dimidiatus*, *N. trimaculatus* (Rossius), *Sphecodes niger* Hagens, *S. reticulatus* Thomson and *S. rubicundus*. *Elampus panzeri* (Fabr.) was new to the Warwickshire list. *Nomada signata* Jurine had not been recorded in the region for many years. The records for *L. brevicorne* and *D. insidiosus* were substantial extensions to the known ranges in Britain. In terms of heathland habitat indicator species, Highgate Common, Hartlebury Common and Devil's Spittleful proved to be much richer for these than the others (Table 2).

Table 2. The number of heathland habitat indicator species at each of the seven sites

	Baddesley Common	Barlaston/ Rough Close	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park NNR
Species requiring heathers	3	0	5	3	4	3	2
Other heathland lovers	3	4	23	16	26	32	13
Coastal-biased species	0	0	3	0	4	0	0
Total indicators	6	4	31	19	34	35	15

Discussion

Factors affecting comparative richness

With the exception of Hartlebury Common and Devil's Spittleful, which were recorded exclusively by Dr Archer in a comparable manner, all the other sites had experienced different levels of recording, which made comparison rather difficult based on gross data. However, comparisons become easier if data are viewed more selectively. The initial survey of Barlaston/Rough Close Common, Gentleshaw Common and Highgate Common by the author in 1994 and 1995 was done in a comparative manner involving four 5–6 hour visits to each site in fine weather on similar dates. It revealed that Highgate was relatively rich (77 species), Barlaston/ Rough Close Common was relatively poor (52 species) and Gentleshaw was intermediate (64 species). The total recording effort for Highgate Common (which extended beyond 1995) and Sutton Park was also broadly similar (about a dozen visits on varied dates). It was clear that Highgate was by far the richer of the two, and had good populations of many key species, including the relatively conspicuous *Bombus jonellus* (Kirby), *Epeolus cruciger* (Panzer) and *Ammophila sabulosa* (L.) that could not be detected at Sutton Park despite targeted searches. Another way sites were compared was by examining data from single dates during key flowering peaks e.g. August when the heather is fully in flower, or April when vernal species are most active. For sites visited by the author, this supported a ranking of least rich to most rich sites in the order of Baddesley Common, Barleston/Rough Close Common, Sutton Park, Gentleshaw Common and Highate Common. Careful examination of the data for Devil's Spittleful and Hartlebury Common (Archer, 2002, 2004) suggested that they both approach Highgate Common in richness, but require further spring visits to sample *Andrena* and *Nomada* species in detail as these seemed to be rather poorly represented in the site lists. A number of factors are likely to be influencing the richness of a site:

- **Site size and the provision of key habitats**. Larger sites with more plentiful open ericaceous heathland alongside a variety of other habitats (especially reasonable quantities of flowery 'verge') seemed to be richer than smaller sites with only a limited provision of open heathland (e.g. Barlaston/Rough Close Common and Baddesley Common) or limited flowery verge. But size was clearly not the only factor at play, because the very large Sutton Park (989 ha) was clearly not as rich as the moderately-sized Highgate Common (94ha).
- **Geographical location and altitude**. Gentleshaw Common and Barleton/Rough Close Common are elevated sites ecologically akin to the nearby Cannock Chase, with upland heathland elements in their vegetation. Highgate Common, Hartlebury Common and Devil's Spittleful which are located much further south and at lower altitude, have a character much closer to typical southern English lowland heathland and supported a much larger number of southern-biased species. Sutton Park seemed to fall between the two categories. Within the West Midlands, there seems to be a tailing off of aculeate diversity in heathland as one moves north and on to higher land.
- **Geology, topography and ground conditions**. Geology and hydrology influences the friability of sandy ground and its suitability for fossorial species, some of which appear to be very selective about where they nest. Topography can influence the presence of warm, south-facing slopes and banks that are favoured by many species. At all the sites studied by the author, there were clear concentrations of mixed-species nesting colonies along certain stretches of footpath or in old

quarries. Here sandy ground was dry, relatively firm and fully exposed to the sun, but very loose sand, damper or semi-shaded stretches of sandy footpaths had much lower interest.

- **Site history**. Highgate Common had experienced a long history of motorcycle activity prior to becoming a country park. Whilst this might have been viewed as incompatible with nature conservation at the time, it has left a legacy of much sandy ground that clearly suits many ground-nesting species. At Gentleshaw Common, by contrast, the relatively pristine heathland, much of which has a wet or humid nature, has considerably less good nesting habitat for bees and wasps. A history of quarrying at Gentleshaw Common, Barleston/Rough Close and Baddesley Common provides important nesting habitat and is likely to be responsible for stronger populations of many species and greater overall richness than might otherwise exist. The historical presence of unstable blown sands at Hartlebury and possibly Devil's Spittleful seems to be the factor underlying the presence of several coastal-biased species there.

Factors affecting the presence of rare species and fine habitat indicator assemblages

Table 1 clearly illustrates the considerable importance of Highgate Common, Hartlebury Common and Devil's Spittleful for scarcer bees and wasps, many of which were unknown from any other sites in the West Midlands at the time of the surveys e.g. *Ammophila pubescens* Curtis (Plate 5, Fig. 5), *Andrena argentata*, *A. bimaculata* (Kirby), *A. nigrospina* Thomson (Plate 5, Fig. 6), *A. ovatula* (Kirby), *Dasypoda hirtipes*, *Diodontus insidiosus*, *Hedychridium cupreum* (Dahlbom), *Lasioglossum brevicorne*, *L. parvulum* (Schenck), *Megachile maritima*, *Melitta haemorrhoidalis* (Fabr.), *Nomada fulvicornis* Fabr., *Oxybelus argentatus* Curtis, *Podalonia affinis* (Kirby), *Priocnemis gracilis* Haupt and *Sphecodes reticulatus* Thomson. Geographical location, coupled with reasonably large site size and the presence of particularly fine sandy nesting habitat seemed to be important factors underpinning this. These factors are also likely to be responsible for the relatively large number of heathland indicator species, and it appears that relatively small and isolated fragments of heathland such as Barleston/Rough Close and Baddesley Common had much less capacity for supporting typical heathland species than larger sites. *Andrena humilis*, *Lasioglossum fratellum* (Pérez) and *Priocnemis schioedtei* Haupt are notable for being capable of clinging on to small or degraded fragments of heathland or acid grassland lacking heathers.

Of the rare species encountered, two deserve particular mention. The colony of *Andrena nigrospina* at Highgate is one of only a handful currently known to exist in Britain (Fig. 5). The autecological work by the author reaffirmed that it is a univoltine species peaking in high summer in contrast to the almost identical but bivoltine *A. pilipes* (Fabr.) that predominates in coastal districts of southern Britain. The autecological study also revealed that the univoltine population of *Nomada fulvicornis* attacking *A. nigrospina* is consistently different in appearance to the bivoltine population of *N. fulvicornis* attacking the closely-related *Andrena bimaculata* at the same site (see Falk, 2004). DNA analysis is required to more fully understand the taxonomic relationship between the two forms. More recent work by Andy Jukes and others at a colony in Worcestershire has revealed that *A. nigrospina* may rely heavily on wild radish *Raphanus raphanistrum* at arable field margins for pollen (Jukes, 2009).

The Rarity Score approach versus the Archer Species Quality Score

The ranking of sites based on scarcer species comes out the same using both approaches, but a poorer sensitivity of the Archer Species Quality Score is revealed in the identical scores obtained for Sutton Park (92 species and a Rarity Score of 460) and Baddesley Common (57 species and a Rarity Score of 260) and also for the relative scores as a whole. It would be difficult to conclude that Sutton Park and Baddesley Common are similar in quality using raw data, and this perhaps highlights the dangers in converting raw data to scores and indexes using equations. This suggests that it is better to strive towards comparable levels of recording at different sites that need to be compared or to focus on comparable elements within existing data for those sites.

THE VALUE OF INDIVIDUAL HEATHLAND HABITATS FOR BEES AND WASPS

There was considerable variation in the importance of the different habitats constituting heathland *sensu lato* for bees and wasps, and this was greatly influenced by the time of year and the precise floristic composition of the various vegetation types. The numbers of species recorded from the various habitats surveyed by the author during his studies are shown in Table 3.

Fig. 5. A mining bee nest (suspected *Andrena nigrospina*) at a path edge.

Table 3. The number of species recorded in the various habitats present at Barlaston/Rough Close, Gentleshaw, Highgate and Sutton Park, based on data from the 1994–95 Staffordshire survey and the 1996–97 Sutton Park survey.

	Barlaston Rough Close	Gentleshaw Common	Highgate Common	Sutton Park NNR
Heather-dominated areas	5	19	26	19
Dry, acid grassland	10	5	28	35
Wet and humid heath	6	9	–	18
Bare or sparsely-vegetated sand	36	48	50	31
Bracken stands	4	6	10	7
Heath verge (Sutton Park not covered)	33	47	52	–
Gorse and broom scrub (Gentleshaw not covered)	2	–	11	11
Pool, mire, water edge and marshy grassland	2	0	1	27
Coniferous woodland (Sutton Park only)	–	–	–	3
Dry, broad-leaved woodland (Sutton Park only)	–	–	–	32
Wet woodland & carr (Sutton Park only)	–	–	–	13

Dashes signify a lack of data.

Heather-dominated areas

For much of the year, heather-dominated vegetation was a fairly unproductive habitat, but during the flowering of ling *Calluna vulgaris* (typically August and September), bell heather *Erica cinerea* (mid June to September) and cross-leaved heath *Erica tetralix*. (July to September), such areas were heavily exploited by foraging insects of many sorts. These included two oligolectic bees, *Colletes succinctus* and *Andrena fuscipes*, which forage mainly on heathers; also large numbers of *Bombus*, *Lasioglossum*, *Sphecodes* and *Nomada rufipes* Fabr. Predatory wasps also used heather flowers as a bountiful source of prey, with *Cerceris rybyensis* and *Philanthus triangulum* (Fabr.) (Plate 5, Fig. 4) hunting for bees whilst *Mellinus* hunted flies. The pompilid *Priocnemis schioedtei* was not observed visiting flowers but seemed to favour a heather-acid grassland/bare sand mosaic and may have been hunting spiders that specifically require this mosaic. *Ammophila sabulosa* also favoured ericaceous vegetation at Highgate Common and presumably finds its caterpillar prey here or in the grassy interstices. But its requirement for heather is not obligatory in contrast to the much rarer *A. pubescens* which was found at Hartlebury (Plate 5, Fig. 5). Heather-dominated vegetation also supported some of the other useful forage flowers listed under dry acid grassland below, plus (at Highgate) plentiful western gorse *Ulex gallii*.

Bare sandy ground

Bare or sparsely-vegetated sandy ground is an essential feature for the many fossorial bees and wasps plus the large number of cleptoparasites they support. This includes other bees and wasps, flies such as *Bombylius*, *Metopia*, *Macronychia*, *Senotainia* and *Leucophora*, plus an important population of the oil beetle *Meloe proscarabaeus* L. at Highgate. As stated above, bare ground was observed to vary significantly in character and this greatly influenced the distribution of nesting by a species and the richness of a mixed nesting colony. This was particularly evident at Highgate, where two relatively small sandy areas supported particularly rich nesting

colonies including the main nesting areas for many of the scarcer species present (e.g. *Andrena nigrospina*, *A. bimaculata* and *Philanthus triangulum*), even though a much larger network of sandy paths was available. Factors that appeared to influence the distribution of nests included dampness of the ground, its precise composition (e.g. the balance of sand versus clay or humus/peat and particle size), the pattern of trampling, degree of shading, width of a path, aspect, exposure to prevailing winds and probably the age of a path. Most fossorial species favour ground that is fully exposed to the sun, faces south, is easily accessed from foraging or hunting areas, and is not excessively churned up by bikes or horses. It should be noted that within footpaths and other well-trampled areas, a gradient of disturbance will typically occur between bare sand and adjacent ericaceous vegetation or acid grassland, and many species favour intermediate stages within this gradient, including firm bare ground, mossy areas or short turf. A few species were found to tolerate more shaded areas e.g. *Andrena fucata* Smith and *A. scotica* Perkins (often betrayed by their *Nomada* parasites) and *Priocnemis susterai* Haupt. The less trampled margins of footpaths can also be a valuable source of flowers such as dandelions and daisy *Bellis perennis*, which are visited by certain *Andrena*, *Lasioglossum* and *Nomada* species.

As noted earlier, bare ground comprising sand that was once mobile blown sands (notably at Hartlebury Common) supported a number of characteristic species that avoid more compacted or finer sands, notably the four ‘Coastal’ species listed in Table 2. Several further species, including *Colletes fodiens* Geoffroy and *Dryudella pinguis* (Dahlbom), also tolerate loose sands, but are rather more frequent inland.

Dry acid grassland

The value of dry acid grassland for bees and wasps was heavily dependent on the flowers within it and the presence of bare ground. Where floristically poor and dominated by a dense turf of grasses such as wavy hair-grass *Deschampsia flexuosa*, it remained an unproductive habitat for much of the year. Important forage plants that improved its value included cat’s-ear and mouse-ear hawkweed (especially for *Andrena humilis* and *Lasioglossum* species), ragwort (many bee and wasp genera), common bird’s-foot-trefoil (especially for *Bombus*, *Megachile*, *Hoplitis claviventris* (Thomson) and certain *Andrena* species), harebell (for *Melitta haemorrhoidalis*), bilberry (for *Andrena lapponica* Zetterstedt and certain *Bombus* species), tormentil *Potentilla erecta* (for *Andrena tarsata* Nylander, *Lasioglossum* species and smaller *Andrena*), heath bedstraw *Galium saxatile* (for *Lasioglossum* species and smaller *Andrena*), rosebay willowherb *Chamerion angustifolium* (especially for *Bombus*, *Megachile*, *Nomada* and *Philanthus*), patches of heathers, gorses, broom and any bushes of rowan, hawthorns or *Prunus* species.

Bracken stands

Dense bracken *Pteridium aquilinum* was one of the least productive parts of the sites, supporting few flowers before the bracken fronds had developed and holding very little interest for bees and wasps once they had fully formed. In spring, male *Andrena* and *Priocnemis* species were sometimes observed using sunlit dead bracken litter for swarming, presumably because it produces warm microclimates.

Wet and humid heath, mire and water edge

Again, the value of these moist habitats depended on the flowers present and they were least productive for bees and wasps when dominated by dense tussocks of

purple moor grass *Molinia caerulea*. Valuable flowers noted were cross-leaved heath, devil's-bit scabious *Succisa pratensis*, *Dactylorhiza* orchids and at Sutton Park, marsh thistle *Cirsium palustre*, meadow thistle *Cirsium dissectum*, wild angelica *Angelica sylvestris*, water mint *Mentha aquatica*, great willowherb *Epilobium hirsutum* and also some of the plants listed under dry acid grassland. Bumblebees were especially numerous in flowery wet heath.

Flowery 'verge' habitat

This habitat was typically the most floristically diverse part of a heathland and tended to coincide with areas of enriched soil around the edges of sites and along the verges of intersecting roads or tracks. Valuable forage plants present in verge habitat include umbellifers (e.g. common hogweed, cow parsley *Anthriscus sylvestris* and hedge parsley *Torilis japonica*), thistles, black knapweed, dandelions, vetches, clovers *Trifolium* spp., dead nettles *Lamium* spp., comfreys *Symphytum* spp., buttercups *Ranunculus* spp., ground-ivy *Glechoma hederacea*. (and any other lamiates), and shrubs such as grey willow, hawthorns, roses, wild cherry, rowan, crab apple *Malus sylvestris* and brambles. Floristically-rich verge habitat seems to substantially increase the diversity of bees and wasps at a site and the number of scarcer species present. It is also an important source of prey for certain sphecid wasps e.g. *Ectemnius* species which like to hunt on umbellifer flowers. The paucity of flowery verge habitat at Sutton Park was regarded as one of the reasons for the relatively poor diversity of bees and wasps recorded there.

Gorses and broom

The flowers of these shrubs attracted certain *Bombus*, *Andrena*, *Lasioglossum* and *Halictus* species, often in very large numbers. *Andrena bimaculata*, *A. dorsata* and *A. ovatula* seemed particularly dependent upon common gorse in spring and males formed large swarms around flowering bushes. Certain *Andrena* species regularly swarmed around blossoming broom, most notably the males of the rare *A. nigrospina* at Highgate, though the females did not appear to forage on it. Females of *A. synadelpha* clearly were attracted by broom flowers at Highgate and bumblebees visited it too for pollen, though it does not produce nectar. At Highgate, western gorse flowered at the same time as heathers and supported some bumblebee foraging though most bees and wasps preferentially visited heathers.

Woodlands, scrub and carr

Relatively little bee and wasp activity was observed to take place within the interior of shaded woodland, dense scrub or carr, though these habitats benefited the fauna in a number of ways. The blossoms of willows, hawthorn, *Prunus*, *Sorbus* and *Acer* species are vitally important for spring flying *Andrena* species and queen bumblebees. A further valuable feature of woodland, scrub and carr is the dead wood it produces, which provides nesting opportunites for wasps such as *Crossocerus*, *Ectemnius* and *Pemphredon*, plus *Osmia* and *Megachile* bees. Sutton Park was the most important in this respect, having a good number of veteran trees, plus some large log piles resulting from regular tree work. Even piles of old building timbers or old wooden sheds (as present in the ranger's yard at Highgate) supported a variety of dead wood-nesting species.

It is important to bear in mind that many bee and wasp species will require several of the above-mentioned habitats to complete a life cycle. For bees with two

generations, e.g. *Andrena bimaculata*, the floristic requirements are likely to vary substantially between the spring generation (peaking in April) and the summer generation (peaking in July). If just one of the requirements of one of the generations is lost, the bee could become locally extinct.

Evidence for local losses and gains on West Midlands heathland

It is clear from data gathered by the Bee, Wasp and Ant Recording Society that the bee and wasp faunas of most parts of Britain are changing (e.g. Edwards 1997 & 1998, Edwards & Telfer, 2001 & 2002), and this is affecting many habitats including heathland. These changes involve both loss of species (usually in response to habitat loss and fragmentation) plus gains as certain southern-biased species and recent British colonists expand their ranges north. Most of the sites covered here lack good historic data, but a review of old literature records for insects at Sutton Park (Falk & Lane, 1999) added 21 species to the site list and strongly suggests several species are likely to have been lost including *Andrena tarsata* Nylander, *Bombus distinguendus* Morawitz and *B. jonellus*. Species that appear to have disappeared completely from West Midlands heathland on the basis of published national data include *Bombus distinguendus*, *B. sylvarum* (L.), *Eucera longicornis* (L.) and *Nomada roberjeotiana* Panzer. This has been counter-balanced by the arrival of *Philanthus triangulum*, *Cerceris rybyensis*, *Dolichovespula saxonica* (Fabr.), *Lasioglossum brevicorne*, *Sphecodes niger* Hagens and *S. reticulatus*.

Conclusions

The remaining heathland of the West Midlands contributes substantially to the biodiversity of bees and wasps in Britain, extending the ranges of many species and supporting some critically important individual populations. There is still a great deal to learn about these sites and informed management and monitoring will be crucial for sustaining or improving the quality of the fauna. One of the most positive outcomes of the above studies has been the notification of Highgate Common as a Site of Special Scientific Interest, and also the funding that has been made available to study the autecology of *Andrena nigrospina* at Highgate Common and a Worcestershire site. Staffordshire Biodiversity Partnership also managed to pursuade JCB to act as the champion for Solitary Bees and Wasps in Staffordshire, and provide some funding for surveys and site management work (see *www.sbap.org.uk/saps/bees* and *www.sbap.org.uk/haps/lowheath*).

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APPENDIX. A full list of the bees and wasps for the seven sites, highlighting the scarce species and habitat indicator species (Quality Indicator species). Key: RDB1, 2 & 3 – Nationally Threatened categories, N – Nationally Scarce, R – Regionally Scarce in the West Midlands Region, Er – heather (*Calluna* and *Erica*) associated species, HL – other species strongly associated with heathland in the Midlands, Coastal – species with a strong coastal bias. An asterix after the name indicates a misleading national grading. A bracketed grading indicates a more realistic grading.

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Chrysididae							
Chrysis angustula Schenck			+				+
Cleptes semiauratus (L.) N* (no status)							+
Elampus panzeri (Fabr.) R, HL						+	+
Hedychridium ardens (Latreille *in* Coquebert) R, HL			+	+	+	+	+
Hedychridium cupreum (Dahlbom) N, HL			+		+		
Trichrysis cyanea (L.)			+	+			
Tiphiidae							
Methocha articulata Latreille N, HL				+		+	
Tiphia minuta Vander Linden N* (no status)						+	
Mutillidae							
Myrmosa atra Panzer	+			+	+	+	
Sapygidae							
Sapyga quinquepunctata (Fabr.)					+		
Pompilidae							
Agenioideus cinctellus (Spinola) R			+		+		
Anoplius nigerrimus (Scopoli)	+			+			
Anoplius viaticus (L.) R, HL							+
Arachnospila anceps (Wesmael)			+	+	+	+	
Arachnospila trivialis (Dahlbom) R, HL					+	+	
Arachnospila spissa (Schiødte)		+	+			+	+
Dipogon subintermedius (Magretti)			+				
Episyron rufipes (L.) R			+		+		

(*continued*)

APPENDIX. *(continued)*

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Evagetes crassicornis (Shuckard) R			+		+	+	+
Priocnemis gracilis Haupt N, HL						+	
Priocnemis parvula Dahlbom			+		+	+	+
Priocnemis perturbator (Harris)			+		+	+	
Priocnemis schioedtei Haupt N, HL		+	+			+	
Priocnemis susterai Haupt R, HL				+		+	
Vespidae							
Ancistrocerus nigricornis (Curtis)			+			+	
Ancistrocerus parietum (L.)							+
Ancistrocerus trifasciatus (Müller)					+	+	+
Dolichovespula media (Retzius)				+			
Dolichovespula norwegica (Fabr.)		+		+			+
Dolichovespula saxonica (Fabr.) RDBK* (no status)				+		+	
Dolichovespula sylvestris (Scopoli)	+	+	+	+		+	+
Symmorphus bifasciatus (L.)				+			+
Vespa crabro L.			+				
Vespula germanica (Fabr.)	+	+	+	+	+	+	+
Vespula rufa (L.)	+	+	+	+	+	+	+
Vespula vulgaris (L.)	+	+	+	+	+	+	+
Sphecidae							
Ammophila pubescens Curtis R* (N), Er			+		+		
Ammophila sabulosa (L.) R, HL			+		+	+	
Podalonia affinis (Kirby) RDB3* (N), Coastal					+		
Crabronidae							
Argogorytes mystaceus (L.)	+		+	+		+	+
Cerceris arenaria (L.) R, HL			+		+	+	
Cerceris rybyensis (L.) R, HL			+	+	+	+	+
Crabro cribrarius (L.) R, HL			+			+	+

(continued)

APPENDIX. *(continued)*

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Crabro peltarius (Shreber) R, HL			+		+	+	
Crossocerus annulipes (Lepeletier & Brullé)							+
Crossocerus distinguendus (Morawitz) N				+			
Crossocerus elongatulus (Vander Linden)				+			
Crossocerus megacephalus (Rossi)			+			+	+
Crossocerus nigritus Lepeletier & Brullé						+	
Crossocerus ovalis Lepeletier & Brullé	+	+	+	+		+	+
Crossocerus podagricus (Vander Linden)						+	
Crossocerus pusillus Lepeletier & Brullé			+	+		+	+
Crossocerus quadrimaculatus (Fabr.)			+	+	+	+	+
Crossocerus tarsatus (Shuckard)		+		+		+	
Crossocerus wesmaeli (Vander Linden) R, HL			+		+		
Diodontus insidiosus Spooner RDB3, HL						+	
Diodontus minutus (Fabr.) R			+			+	
Diodontus tristis (Vander Linden) R, HL			+		+	+	
Dryudella pinguis (Dahlbom) R, HL					+		
Ectemnius cavifrons (Thomson)			+				+
Ectemnius cephalotes (Olivier)							+
Ectemnius continuus (Fabr.)				+	+	+	+
Ectemnius ruficornis (Zetterstedt) N				+			
Gorytes quadrifaciatus (Fabr.)						+	+
Harpactus tumidus (Panzer) R	+				+	+	?
Lindenius albilabris Fabr.	+		+	+	+	+	+
Lindenius panzeri (Vander Linden) R* (N), HL				+			
Mellinus arvensis (L.)	+	+	+	+	+	+	+
Mimesa equestris (Fabr.) R, HL			+	+	+	+	+
Mimesa lutaria (Fabr.) R, HL			+	+	+	+	
Mimumesa dahlbomi (Wesmael)						+	+
Nysson dimidiatus Jurine N* (R)						+	+

(continued)

APPENDIX. *(continued)*

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Nysson spinosus (Forster)				+		+	+
Nysson trimaculatus (Rossi) N						+	
Oxybelus argentatus Curtis N, Coastal			+		+		
Oxybelus uniglumis (L.)	+	+	+	+	+	+	+
Passaloecus corniger Schuckard			+				+
Passaloecus monilicornis Dahlbom R, HL							+
Pemphredon inornata Say							+
Pemphredon lethifera (Schuckard)					+	+	+
Pemphredon lugubris (Fabr.)			+	+		+	+
Pemphredon morio Vander Linden N			+				
Philanthus triangulum (Fabr.) RDB2* (R)			+	+	+	+	+
Psenulus pallipes (Panzer)					+		
Rhopalum clavipes (L.)				+	+		+
Rhopalum coarctatum (Scopoli)				+			
Stigmus solskyi Morawitz							+
Tachysphex pompiliformis (Panzer) R, HL			+	+	+	+	+
Trypoxylon attenuatum Smith	+						+
Trypoxylon clavicerum Lepeletier & Serville			+				
Trypoxylon figulus (L.) *sensu lato*				+			
Apidae							
Andrena angustior (Kirby) R			+	+	+		
Andrena argentata Smith N, Er			+				
Andrena barbilabris (Kirby)		+	+	+	+	+	+
Andrena bicolor Fabr.	+		+	+	+	+	
Andrena bimaculata (Kirby) N, HL			+		+	+	
Andrena bucephala Stephens N			+				
Andrena chrysosceles (Kirby)	+			+	+		
Andrena cineraria (L.)	+	+	+	+	+	+	+
Andrena clarkella (Kirby)		+	+	+		+	+

(continued)

APPENDIX. *(continued)*

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Andrena coitana (Kirby) R				+			
Andrena denticulata (Kirby)			+	+		+	
Andrena dorsata (Kirby) R, HL			+	+	+	+	
Andrena fucata Smith	+		+	+		+	+
Andrena fulva (Müller *in* Allioni)	+	+		+	+	+	+
Andrena fuscipes (Kirby) R, Er	+		+	+	+	+	+
Andrena haemorrhoa (Fabr.)	+	+	+	+	+	+	+
Andrena humilis Imhoff N, HL	+	+	+	+	+	+	+
Andrena labialis (Kirby)						?	
Andrena labiata Fabr. N				+			
Andrena lapponica Zetterstedt R, HL		+		+			
Andrena minutula (Kirby)			+				
Andrena nigriceps (Kirby) N			+			+	
Andrena nigroaenea (Kirby)	+	+	+	+	+	+	+
Andrena nigrospina Thomson (RDB1), HL						+	
Andrena nitida (Müller)				+		+	
Andrena ovatula (Kirby) R, HL			+		+	+	
Andrena semilaevis Pérez	+	+	+	+		+	
Andrena scotica Perkins	+	+	+	+	+	+	+
Andrena subopaca Nylander		+	+				
Andrena synadelpha Perkins			+	+	+	+	
Andrena tarsata Nylander R, HL					+		
Andrena tibialis (Kirby) N					+		
Andrena wilkella (Kirby)	+	+		+	+	+	
Anthidium manicatum (L.)					+		
Anthophora furcata (Panzer)							+
Bombus bohemicus (Seidl)		+	+	+	+	+	
Bombus campestris (Panzer)			+	+	+		+
Bombus hortorum (L.)		+	+	+	+	+	+

(continued)

APPENDIX. *(continued)*

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Bomus humilis Illiger N				+			
Bombus jonellus (Kirby)				+		+	
Bombus lapidarius (L.)	+	+	+	+	+	+	+
Bombus lucorum (L.)	+	+	+	+	+	+	+
Bombus magnus Vogt R, HL				+			
Bombus pascuorum (Scopoli)	+	+	+	+	+	+	+
Bombus pratorum (L.)	+	+	+	+	+	+	+
Bombus ruderarius (Müller)						+	
Bombus rupestris (Fabr.)				+			
Bombus sylvestris Lepeletier	+	+		+	+		+
Bombus terrestris (L.)	+	+	+	+	+	+	+
Bombus vestalis (Geoffroy)	+	+	+	+	+	+	+
Chelostoma campanularum (Kirby) R			+				
Colletes daviesanus Smith	+		+	+		?	?
Colletes fodiens (Geoffroy) R, HL			+		+		
Colletes similis Schenck R	+		+				
Colletes succinctus (L.) R, Er	+		+	+	+	+	+
Dasypoda hirtipes (Fabr.) N, Coastal			+		+		
Epeolus cruciger (Panzer) R, Er	+		+	+	+	+	
Epeolus variegatus (L.) R			+	+	+	+	+
Halictus rubicundus (Christ)	+	+	+	+	+	+	+
Halictus tumulorum (L.)	+	+	+	+	+	+	+
Hoplitis claviventris (Thomson) R	+		+				+
Hylaeus brevicornis Nylander			+		+	+	+
Hylaeus communis Nylander			+	+			+
Hylaeus hyalinatus Smith	+		+	+			
Hylaeus signatus (Panzer) N* (R)	+				+		
Lasioglossum albipes (Fabr.)		+	+				+
Lasioglossum brevicorne (Schenck) RDB3, HL					+	+	

(continued)

APPENDIX. *(continued)*

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Lasioglossum calceatum (Scopoli)		+	+	+		+	+
Lasioglosum cupromicans (Pérez)	+		+	+			
Lasioglossum fratellum (Pérez) R, HL		+		+	?		+
Lasioglossum lativentre (Schenck)				+		+	
Lasioglossum leucopus (Kirby)	+		+	+		+	+
Lasioglossum leucozonium (Schrank)	+		+	+	+	+	
Lasioglossum minutissimum (Kirby)			+		+	+	
Lasioglossum morio (Fabr.)			+			+	
Lasioglossum parvulum (Schenck) R, HL			+			+	
Lasioglossum punctatissimum (Schenck) R, HL			+		+	+	+
Lasioglossum quadrinotatum (Kirby) N, HL			+		+	+	
Lasioglossum rufitarse (Zetterstedt)	+	+	+	+			+
Lasioglossum smeathmanellum (Kirby)			+	+			
Lasioglossum villosulum (Kirby)	+	+	+	+	+	+	+
Megachile ligniseca (Kirby)			+		+	+	
Megachile maritima (Kirby) R, Coastal			+		+		
Megachile versicolor Smith			+	+	+	+	
Megachile willughbiella (Kirby)			+		+	+	+
Melitta haemorrhoidalis (Fabr.) R, HL					+	+	
Melitta leporina (Panzer) R			?			+	
Nomada fabriciana (L.)		+		+			
Nomada flava Panzer	+	+	+	+	+	+	+
Nomada flavoguttata (Kirby)		+		+		+	
Nomada flavopicta (Kirby) N			+			+	
Nomada fulvicornis Fabr. RDB3, HL						+	
Nomada goodeniana (Kirby)	+	+	+	+	+	+	+
Nomada integra Brullé N, HL	+			+	+	+	+
Nomada lathburiana (Kirby) RDB3* (no status)	+	+	+	+		+	+
Nomada leucophthalma (Kirby)		+		+		+	+
Nomada marshamella (Kirby)			+	+		+	

(continued)

APPENDIX. *(continued)*

ACULEATE HYMENOPTERA	Baddesley Common	Barlaston/ Rough Close Common	Devil's Spittleful	Gentleshaw Common	Hartlebury Common	Highgate Common	Sutton Park
Nomada panzeri Lepeletier		+		+			
Nomada ruficornis (L.)		+	+	+		+	
Nomada rufipes Fabr. R, HL	+		+	+	+	+	+
Nomada signata Jurine RDB2, HL				+		+	
Nomada striata Fabr.	+	+		+		+	
Osmia caerulescens (L.)							+
Osmia rufa (L.)			+		+	+	+
Sphecodes crassus Thomson N* (no status)	+			+		+	
Sphecodes ephippius (L.)	+	+		+	+	+	+
Sphecodes ferruginatus Hagens N			+		+		
Sphecodes geoffrellus (kirby)	+		+	+	+	+	+
Sphecodes gibbus (L.)	+	+		+		+	
Sphecodes hyalinatus Hagens R					+		
Sphecodes monilicornis (Kirby)	+	+	+	+	+	+	+
Sphecodes niger Hagens RDB3						+	
Sphecodes pellucidus Smith		+	+	+	+	+	+
Sphecodes puncticeps Thomson			+	+	+	+	
Sphecodes reticulatus Thomson N, HL			+		+	+	
Sphecodes rubicundus Hagens N						+	

ANT-LIKE FLOWER BEETLES (COLEOPTERA: ANTHICIDAE) OF THE UK, IRELAND AND CHANNEL ISLES

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Abstract

The Anthicidae or ant-like flower beetles of the UK, Ireland and Channel Isles are reviewed. A species list, identification key, short diagnoses and illustrations of all taxa are given. Brief information on known ecological preferences of species is given.

Key words: identification, distribution, key, United Kingdom, Ireland, fauna, ecology.

Introduction

Anthicidae are a cosmopolitan family of small to medium-sized, fast-moving beetles of the superfamily Tenebrionoidea. Anthicidae are represented in the World fauna by approximately 100 genera, and about 3500 species (Chandler, 2010). Only a few species are known from the fossil record. The last revision of the British Anthicidae was published by F. D. Buck (1954) in the well-known series *Handbooks for the Identification of British Insects.* Since then, there have been numerous nomenclatural changes within Anthicidae, and some additional species (introduced) have been recorded from the UK, making Buck's key out of date.

During 2004 and 2005 a total of 3356 specimens of Anthicidae from the UK and Ireland were examined by the author, mainly from the collections of The Natural History Museum (London), Oxford University Museum of Natural History and National Museum of Ireland. Additional data for more than 2100 specimens were received from other British museums and private collections between 2005 and 2007.

A new key and short diagnoses for the genera are presented, as well as data on habitats and general distribution of species. Palaearctic genera follow Chandler, Nardi & Telnov (2004). The distributional lists provided are not intended to be comprehensive, but will give a general idea of the species occurrence. The following publications have been consulted for data on distribution and ecology, particularly for Channel Islands fauna: Ansted & Latham, (1862); Luff (1894, 1895, 1900 & 1905); Last (1951, 1957, 1966, 1970, 1980 & 1990); Lane (1990) and Duff (2008).

Only species with long-term established populations in the British Isles *sensu lato* are included in this key. *Floydwernerius australis* (King) and *Notoxus numidicus* (Lucas) are excluded for this reason but are described in the detailed species descriptions that follow. The key is based primarily on external morphological characters. For the confirmation of identification for some species, dissection of male genitalia is recommended. A synoptic checklist is provided below to assist with some recent nomenclatural changes that affect the UK literature indicated with square brackets.

Short checklist of taxa native to the UK, Ireland and Channel Islands

ANTHICINAE Latreille, 1819
ANTHICUS Paykull, 1798
subgenus ANTHICUS Paykull, 1798
angustatus Curtis, 1838
antherinus antherinus (Linnaeus, 1760)
bimaculatus (Illiger, 1801)
flavipes flavipes (Panzer, 1796)
scoticus Rye, 1872 [Buck, 1954; Joy, 1932; Pope, 1972]
tristis schaumii Wollaston, 1857

CORDICOLLIS Marseul, 1879
CORDICOMUS Pic, 1894
ANTHICUS sensu auctt. partim non Paykull, 1798
instabilis instabilis (W. L. E.Schmidt, 1842)
tibialis (Curtis, 1838) non (Waltl, 1835)

CYCLODINUS Mulsant & Rey, 1866
ANTHICUS sensu auctt. partim non Paykull, 1798
constrictus constrictus (Curtis, 1838)
humilis sensu auctt. Brit. non (Germar, 1824) [Joy, 1932]
salinus salinus (Crotch, 1867)
crotchi (Pic, 1893) [Joy, 1932]

HIRTICOLLIS Marseul, 1879
ANTHICUS sensu auctt. partim non Paykull, 1798
hispidus (Rossi, 1792)

OMONADUS Mulsant & Rey, 1866
ANTHICUS sensu auctt. partim non Paykull, 1798
bifasciatus (Rossi, 1792)
floralis (Linnaeus, 1758)
formicarius formicarius (Goeze, 1777)
quisquilius (Thomson, C. G., 1864) [Buck, 1954]

STRICTICOLLIS Marseul, 1879
STRICTICOMUS Pic, 1894
ANTHICUS sensu auctt. partim non Paykull, 1798
tobias (Marseul, 1879)

NOTOXINAE Stephens, 1829
NOTOXUS Geoffroy, 1762
monoceros (Linnaeus, 1760)

Identification Key to species of Anthicidae of U.K., Ireland and Channel Isles

1. Pronotum with elongated process (horn) on the anterior margin, extending anteriorly over head (Fig. 1, Plate 8d & e); size 4.0–5.20 mm . *Notoxus monoceros*
– Pronotum without elongated process on anterior margin. 2
2. Anterior tibiae with a tooth externally near apex (Fig. 2); tibial spurs long; body robust, elytra broad and strongly rounded laterally; colour yellow to light yellowish brown, elytra with V-shaped dark transverse marking behind middle (sometimes reduced to a pair of separate macula) (Plate 6d); size 2.95–4.10 mm . . . . *Anthicus bimaculatus*
– Anterior tibiae without apical tooth; tibial spurs reduced; body more slender; colour not as above 3
3. Head and pronotum yellow to reddish, elytra black or brown with basal third yellow and raised medially to oval postmedian spot on each elytron (Plate 8c); eyes large, temples short; size 3.00–4.50 mm. . . . . *Stricticollis tobias*
– Dorsal colouration not as above (at least head and thorax dark) 4
4. Head and thorax with microsculpture between punctures 5
– Head and thorax smooth between punctures, with at most scarcely visible isodiametric microsculpture 7
5. Pronotum anteriorly with pair of small protuberances on disc (best seen obtusely from side). Mesosternum broadly expanded laterally, covering most of the mesepisterna on the ventral surface; the expanded portion with margins almost semicircular and often bearing a fringe of long setae at their edges (Fig. 20); colour variable, dorsum reddish-brown to almost black, only pronotum and basal third of elytra reddish; size 2.50–3.70 mm . . . . *Omonadus floralis*
– Pronotum anteriorly lacking small protuberances on disc. Mesosternum not expanded laterally, its lateral margins straight or curved, leaving most of mesepisterna exposed on ventral surface; without fringe of setae on margins of mesosternum 6
6. Dorsum with sparse, short and appressed pubescence; erect tactile setae short, sparse and inconspicuous; elytra brown to dark brown with reddish basal area (Plate 8b); size 2.70–3.70 mm . . . . *O. formicarius formicarius*
– Dorsum with sparse, short and appressed pubescence, with sparse, moderately long erect setae; elytra dark brown to black, with two pale transverse bands, one in postbasal impression, the second, in postmedian area (both bands may be interrupted at suture) (Plate 7f); size 2.50–3.00 mm. . . . . *O. bifasciatus*
7. Body and legs covered with exceptionally long, dense and erect pubescence; size 2.40–3.10 mm . . . . *Hirticollis hispidus*
– Body and legs covered without exceptionally long, appressed pubescence . . . 8
8. Base of head subconical (Plate 7b–d), medially subangulate or bluntly pointed, basal angles absent 9
– Base of head more or less truncate (Plate 6e,f), not or only slightly produced medially, basal angles evident 10
9. Pronotum slightly larger than head; pronotum more strongly punctate than head and elytra; base of head slightly elongated to a medial blunt point; first antennomere asymmetrical in profile (Plate 8f); colour dark brown to almost black; size 2.20–3.00 mm . . . . *Cyclodinus salinus salinus*
– Pronotum not wider than head, dorsally more strongly punctate than head and elytra; base of head subconical, with subparallel short temples; first antennomere symmetrical in profile (Plate 8f); colour variable, from reddish

brown to almost black, often with indistinct pale spots (sometimes completely absent) in postbasal and postmedian area of elytra; size 2.00–2.70 mm . . . . *C. constrictus constrictus*

10. Mesosternum relatively small, with apex in the form of a narrow strip (slightly raised medially), lateral parts broadly rounded separating mesepisterna from the coxal cavities; eyes large, convex and prominent; whole dorsal surface of the head coarsely punctured; pronotum distinctly constricted on sides behind the middle; humeri well developed; punctures on head and pronotum more or less annulate; male with hind tibiae spatulate (Fig. 10): generally larger species 3.00–4.30 mm . . . . *Cordicollis instabilis instabilis*

– Front of mesosternum with oblique sides, slightly prominent in the median region, lateral parts narrow, not separating mesepisterna from the coxal cavities; eyes smaller, weakly prominent; dorsal surface of the head often with impunctate median line; pronotum not constricted on sides behind the middle; punctures on head and pronotum simple; male hind tibiae simple; size $\geqslant$3.65 mm 11

11. Pronotum short, slightly longer than broad, gradually and slightly narrowing laterally to base; elytra distinctly widened laterally in median part; size 2.00–2.70 mm. . . . . *Anthicus flavipes flavipes*

– Pronotum distinctly longer than broad, constricted laterally behind the middle and with base distinctly narrower than apex. 12

12. Head with a broad impunctate median line reaching vertex; pronotum not distinctly constricted at sides behind middle; dorsum brown to dark brown; size 2.40–2.70 mm . . . . *A. angustatus*

– Head completely punctate; pronotum distinctly narrowed towards base . . . 13

13. Elytra with red marking of variable form, most often an ovoid posthumeral spot on each elytron and cruciate median spot (Plate 6b); dorsum densely and closely punctate, distance between punctures less than their diameter; temples almost straight; size 2.80–3.65 mm . . . . *A. antherinus antherinus*

– Elytra with two pale transverse bands broadly interrupted at suture, one posthumeral, a second postmedian (bands may be indistinct) (Plate 6f); dorsum sparsely punctate, distance between punctures greater than their diameter; temples slightly rounded; size 2.30–3.00 mm. . . . . *A. tristis schaumii*

Abbreviations used within the text

Depositaries

BENHS – British Entomological and Natural History Society, Dinton Pastures;

BMAG – Bolton Museum, Art Gallery and Aquarium, Rye collection;

BMNH – The Natural History Museum (British Museum, Natural History), London;

NMID – National Museum of Ireland, Dublin;

OUMNH – Oxford University Museum of Natural History, Oxford.

General

H – homonym; [i] – imported species; RN – replacement name.

All cited label text is reproduced exactly, with no corrections or additions; labels are separated by slashes /. The present author's comments are placed in square brackets [ ]. Citations of localities from references are placed in "quotation-marks". The taxa are listed alphabetically (except in the identification key), since there is no modern systematic arrangement. Ecological data presented are only relevant to the United Kingdom, Ireland and Channel Islands.

List of taxa

FAMILY ANTHICIDAE – ant-like flower beetles

Description: Head abruptly constricted, neck short to long, sometimes with broad temples; eyes transversely oval (rarely emarginate, unlike Aderidae); antenna 11-segmented, filiform or slightly enlarged apically. Pronotum widest in the anterior half, more or less distinctly narrowing to the base, pronotal base narrower than elytral base. Abdominal sternites I–II freely articulated. Legs generally slender, femora sometimes clavate; tarsal formula 5–5–4.

Distribution: Cosmopolitan.

Diversity: Eight subfamilies, about 100 recent genera and 3500 described species.

SUBFAMILY ANTHICINAE

Distribution: Cosmopolitan.

Diversity: Four tribes (Anthicini, Endomiini, Formicomini, Microhorini), 42 genera, about 2500 species.

Genus *ANTHICUS* Paykull, 1798: 253

Type species: *Meloe antherinus* Linnaeus, 1760

Synonyms: *Birricollis* Marseul, 1879; *Birricomus* Pic, 1894; *Brevicollis* Marseul, 1879; *Brevicomus* Pic, 1894; *Cartolus* Mulsant & Rey, 1866; *Cartolus* Mulsant & Rey, 1866 [H]; *Curticollis* Pic, 1892; *Curticomus* Pic, 1894; *Eonius* C. G.Thomson, 1864; *Nathicus* Casey, 1895; *Nodolinus* Mulsant & Rey, 1866a; *Nodolinus* Mulsant & Rey, 1866b [H]; *Platylorus* Mulsant & Rey, 1866a; *Platylorus* Mulsant & Rey, 1866b [H]; *Pubicollis* Marseul, 1879; *Pubicomus* Pic 1894; *Recticollis* Marseul, 1879.

Distribution: Cosmopolitan.

Diversity: Two subgenera of about 600 species and subspecies, 172 of which occur in the Palaearctic region.

Anthicus angustatus Curtis Plate 6a, Fig. 3

Description: Length 2.40–2.70 mm. Dorsally brown to dark brown. Femora dark, tibiae and tarsi pale. Antennae pale. Head dorsally flattened, coarsely punctate, with a glossy impunctate median longitudinal line that does not reach the vertex. Eyes rather small, weakly prominent. Temples somewhat widened towards the truncate, broadly rounded base. Pronotum elongate, dorsally slightly convex, anteriorly wider than basally, almost straight laterally, densely punctate. Elytra elongate, almost completely rounded at base, humeri absent, without postbasal transverse impression, dorsally densely and partly coarsely punctured. Hind wings atrophied. Dorsal pubescence whitish, quite dense and appressed.

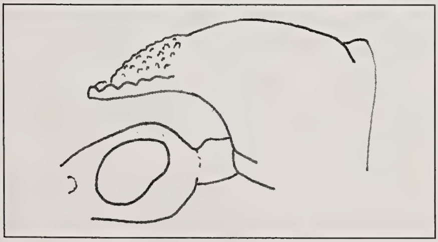


Fig. 1. Genus *Notoxus*: schematic lateral view of forebody (orig.).

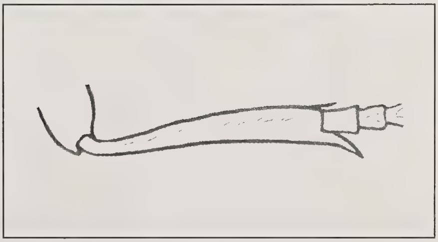


Fig. 2. *Anthicus bimaculatus*: right foretibia (orig.)

Ecology and Biology: Commonly found on sandy shores and salt marshes, in or on bare sand with sparse or no vegetation. Adults and larvae are saprophagous feeding on decaying plant material. Adults are active from May to September. Listed as Nationally Notable B in Hyman (1992).

Distribution. **U.K.**: Dorset, East Cornwall, East Sussex, Isle of Wight, West Cornwall, South Devon, Middlesex, South Lancashire, Isle of Man, West Sussex. **Ireland**: Present. **Channel Islands**: Herm, Jersey. **Palaearctic:** France, U.K., Ireland, Spain (incl. Canary Islands).

Anthicus antherinus antherinus (Linnaeus) Plate 6b & c, Fig. 4

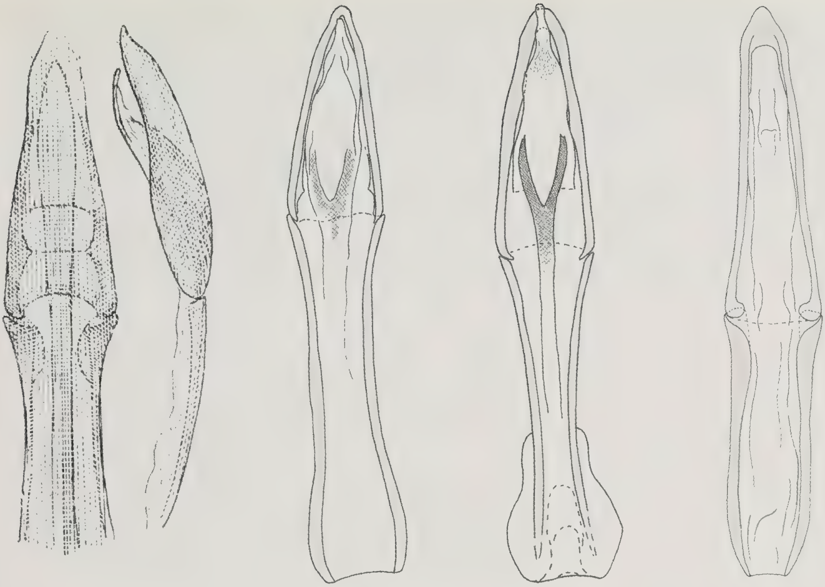
Description: Length 2.80–3.65 mm. Body flattened, black with variable red markings. These markings consist of an ovoid posthumeral spot on each elytron and cruciate median spot (Plate 6b) or can be strongly reduced to only the humeral area (Plate 6c). Femora darker than the reddish tibia and tarsi. Antennomeres usually paler basally, darkening towards apex, terminal antennomeres 2–3 always dark. Head and thorax densely punctate. Eyes rather small, weakly prominent; temples almost straight, base of head truncate to broadly rounded. Elytra subparallel, without postbasal transverse impression; punctures and intervening spaces on elytra larger than on head and pronotum; pubescence of quite dense pale, appressed setae. Hind wings fully developed.

Ecology and Biology: Eurytopic in open habitats, with a preference for dry microhabitats. Found in salt marshes, meadows, forest edges and sea shore. Often found in urban or agricultural landscapes (e.g. hedgerows). Adults and larvae saprophagous, adults occasionally found on wild plants, for example, *Rumex* spp. (Polygonaceae). Adults are active from March to November, occasional records from January (presumably of hibernating adults).

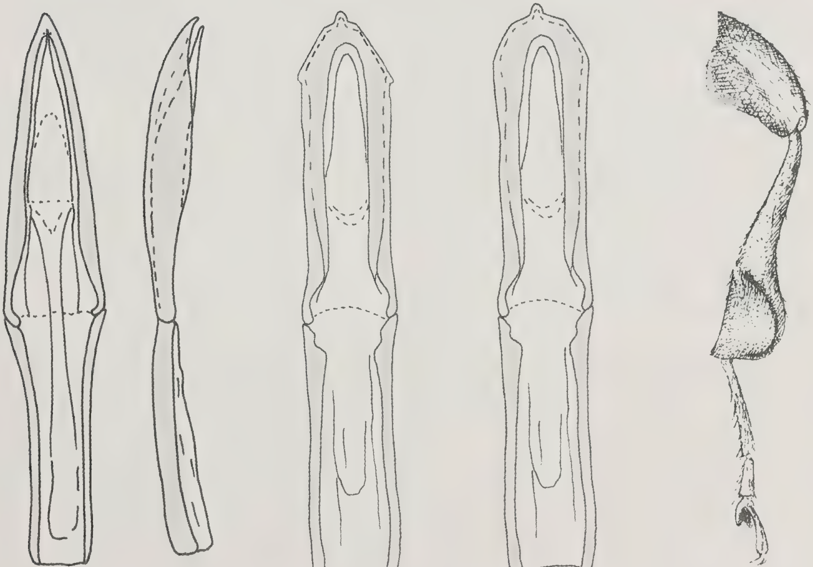
Distribution. **U.K.**: Aberdeenshire, Bedfordshire, Berkshire, Buckinghamshire, Cambridgeshire, Derbyshire, Dorset, East Gloucestershire, East Kent, East Norfolk, East Suffolk, East Sussex, Herefordshire, Huntingdonshire, Isle of Wight, Merionethshire, Middlesex, North Essex, North Somerset, North Wiltshire, Oxfordshire, South Essex, South Hampshire, Staffordshire, Surrey, Warwickshire, West Kent, West Norfolk, West Suffolk, West Sussex and Worcestershire. **Palaearctic:** Afghanistan, Albania, Austria, Azerbaijan, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Latvia, Lebanon, Lithuania, Macedonia, Moldova, Norway, Poland, Portugal (incl. Azores Islands, not on Madeira), Romania, Russia (both European & Asian), Slovakia, Slovenia, Spain (not on Canary Islands), Sweden, Switzerland, Syria, Turkey, Turkmenistan, Ukraine, Uzbekistan and former Yugoslavia.

Notes: The subspecies, *Anthicus antherinus syriae* Pic, 1892 occurs in Afghanistan, France (record needs confirmation), and "Syria" [*sensu lato*]. An extremely similar species, *Anthicus invreai* Koch, 1933 is known from the Balkans, France, Greece, Italy, Spain, Near East (Lebanon), Turkey, and former Yugoslavia (aedeagus – Fig. 5), and atypical specimens of *antherinus* collected on the south-coast of the UK should be compared with the figures provided.

Taxonomy: The type series of *Anthicus antherinus* ab. *ireneae* Donisthorpe (1935a) was studied from the collections of the Natural History Museum. London. Although



3 4 5 6



7 8 9 10

Figs. 3–9. Aedeagal figures of Anthicidae after Bucciarelli (1980), unless stated otherwise. 3: *Anthicus angustatus* (after Bonadona, 1976). 4: *Anthicus antherinus antherinus*. 5: *Anthicus invreai*. 6: *Anthicus bimaculatus*. 7: *Anthicus flavipes flavipes*. 8: *Anthicus tristis schaumii* (orig.). 9: *Anthicus tristis tristis*. Fig. 10. *Cordicollis instabilis instabilis*, male right hand leg.

aberrations are excluded from the International Commission on Zoological Nomenclature (Article 1.3.4.) (ICZN, 1999) it was important to verify the status of this form. The type series of two specimens (label data below) was examined and found to be conspecific with *Anthicus (A.) antherinus antherinus* (Linnaeus, 1760).

Label data for ab. *ireneae* Donisthorpe: Wickham Fen. 10.IX.34 [handwritten] / Type [printed, label circle, red border] / H. Donisthorpe. B. M. 1934-4. [printed]; 1 specimen – HEADCORN Kent. 30.VIII.41 A. M. Massee [handwritten] / A. M. Massee Coll. B. M. 1967–638. Data under card [printed] x1; HEADCORN Kent. 30.VIII.41 A. M. Massee [handwritten] / A. M. Massee Coll. B. M. 1967–638. Data under card [printed] / antherinus ab. ireneae [handwritten] x1.

Anthicus bimaculatus (Illiger) Plate 6d, Fig. 6

Description: Length 2.95–4.10 mm. Dorsum yellow to light yellowish brown with V-shaped dark transverse band behind the middle of elytra, sometimes reduced to two small macula; dorsum minutely punctate. Base of head broadly rounded, dorsally somewhat convex, with large prominent eyes, temples short and rounded. Pronotum campanulate, widened anteriorly, constricted towards distinctly narrower base. Elytra dorsally convex, laterally rounded, suboval, postbasal transverse impression absent; pubescence whitish, fine and appressed. Anterior tibiae externally toothed near the apex.

Ecology and Biology: Psammophilous species of dry sandy habitats, such as dunes, sand hills, sea shores and near water bodies. Adults and larvae saprophagous. Adults are active from April to August. Listed as Notable B in Hyman (1992).

Distribution: **U.K.**: Anglesey, Cheshire, East Kent, East Norfolk, East Sussex, Glamorgan, North Devon, South Lancashire and West Norfolk. **Palaearctic**: Austria, Belarus, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Italy, Kazakhstan, Latvia, Lithuania, The Netherlands, Norway, Poland, Russia (both European & Asian), Sweden, Switzerland and Ukraine.

Anthicus flavipes flavipes (Panzer) Plate 6e, Fig. 7

Description: Length 2.00–2.70 mm. Dorsum brown to dark brown, often with indistinct dark area posteriorly, appendages somewhat paler. Head basally truncate and dorsally flattened, roughly and densely punctured, with a distinct impunctate median longitudinal area reaching vertex; eyes large, temples equal to eye length. Pronotum short and broad, slightly constricted laterally toward base, dorsally densely punctate. Elytra cylindrical, somewhat widened laterally, without postbasal transverse impression; punctures sparser than on head and pronotum; pale pubescence, of relatively dense and appressed setae. Hind wings fully-developed.

Ecology and Biology: Pine forests, forest edges and sandy places, with a preference for dry microhabitats. Adults and larvae are saprophagous. Adults are active from April to September.

Distribution. **U.K.**: Anglesey, Ayrshire, Caernarvonshire, Cheshire, Clyde Isles, Cumberland, Dunbartonshire, East Kent, Fife, Isle of Man, Midlothian, Northamptonshire, Renfrewshire, Staffordshire, South Lancashire and Stirlingshire.

Ireland: Londonderry. **Palaearctic**: Albania, Austria, Belarus, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Macedonia, Moldova, The Netherlands, Norway, Poland, Romania, Russia (both European & Asian), Slovakia, Spain (not on Canary Islands), Sweden, Switzerland, Turkey, Ukraine.

Taxonomy: The taxonomic status of *Anthicus scoticus* Rye, 1872 has long been discussed. This species is currently listed in Hyman (1992) as Red Data Book category 3 and on a number of BAP lists for the UK. Although the species was formally synonymysed with *flavipes flavipes* by Chandler, Nardi & Telnov (2004), further details are presented here.

The type series of *Anthicus scoticus*, consisting of seven specimens (label data below) is housed in the BMAG collection. After careful examination of this series it is certain that they are conspecific with *Anthicus (A.) flavipes flavipes* (Panzer, 1796), and therefore should be treated as a synonym under that species. Although the series bear the labels 'holotype' and 'paratype', these labels are in fact typical *type* labels sourced from the BMNH, and were often put on specimens during routine curation, and as such are invalid designations. In the case of *A. scoticus*, Rye (1872: 10) did not formally designate a holotype, therefore this series are syntypes (ICZN Art. 73.2). Apart from a single specimen (explained below), all the specimens bear no original Rye labels or marks, though are almost certainly part of the original series on which Rye based his description, as he states "one of my specimens seems, in certain lights, to possess a faint tendency to a dark brown humeral spot." (Rye, 1872: 11). The two associated printed labels: E. C. Rye [printed] / 4101–4107 [printed] are in fact collection labels from P. B. Mason (1842–1903), who purchased the Rye collection, which was then later purchased from Mrs. Mason by Bolton Museum (Hancock, 1985).

One specimen labelled: "Anthicus scoticus mihi M.S." [handwritten, Rye] / X [handwritten] / E. C. Rye [printed, P. B. Mason collection label] / 4105 [printed, P. B. Mason collection label] / Holo-type [printed, label circular, border red, BMNH style type label], is the best candidate, if the need arises to be designated as the lectotype, since it is the only specimen bearing any indication of type status in the hand of Rye.

Material examined: Syntype 2. [printed, label circular, yellow border, BMNH style type label: Invalid: Invalid] / E. C. Rye [printed] / 4101 [printed, P. B. Mason collection label]; Syntype 3. [printed, label circular, yellow border, BMNH style type label: Invalid] / E. C. Rye [printed, P. B. Mason collection label] / 4102 [printed, P. B. Mason collection label]; 4. [printed, label circular, yellow border, BMNH style type label: Invalid] / E. C. Rye [printed, P. B. Mason collection label] / 4103 [printed, P. B. Mason collection label]; Syntype 4 [printed, label circular, yellow border, BMNH style type label: Invalid] / E. C. Rye [printed, P. B. Mason collection label] / 4104 [printed, P. B. Mason collection label]; Syntype 5. [printed, label circular, yellow border, BMNH style type label: Invalid] / E. C. Rye [printed, P. B. Mason collection label] / 4106 [printed, P. B. Mason collection label]; Syntype 6. [printed, label circular, yellow border, BMNH style type label: Invalid] / E. C.Rye [printed, P. B. Mason collection label] / 4107 [printed, P. B. Mason collection label].

Anthicus tristis schaumii Wollaston — Plate 6f, Fig. 8

Description: Length 2.30–3.00 mm. Dorsum colour variable, from nearly completely black to brown with reddish head and pronotum, elytra with often indistinct yellowish, orange or reddish spots in postbasal and postmedian area

interrupted at suture. Appendages reddish to yellowish, with femora darker than tibiae and tarsi. Head dorsally slightly convex, with dense shallow punctures; eyes small and weakly prominent; temples somewhat rounded; base of head broadly rounded. Pronotum anteriorly wider than base, converging laterally towards base. Elytra cylindrical, flattened dorsally, punctures larger and more sparse than on head and pronotum; elytra without postbasal transverse impression; humeri weakly developed; elytra with two, often indistinct bands of dense setae, the first posterior to base and entire, the second, postmedian and interrupted at the suture.

Ecology and Biology: Sea shore and sand dunes. Adults are active from March to October. This species is listed in Hyman (1992) as Red Data Book category 1 "Endangered".

Distribution. **U.K.**: Dorset, East Cornwall, Isle of Wight, South Devon and South Hampshire. **Channel Islands**: Guernsey, Herm and Jersey. **Palaearctic**: France, U.K., Morocco, Portugal (not on Azores Islands & Madeira), Spain (not in Canary Islands). Current subspecies distributed mainly along the Atlantic coast.

Notes: One completely black female individual, with only joints 2-6 of antennae pale was noted from Island of Guernsey (coll. A. Fowles). The nominative subspecies, *A. tristis tristis* W. L. E. Schmidt, 1842 (aedeagus as in Fig. 9) is widely distributed in the Palaearctic from the Atlantic coast of Europe and North Africa to the Central Asia (Uzbekistan, Turkmenistan). However, all British specimens so far examined belong to the subspecies *Anthicus tristis schaumii* Wollaston.

Genus *CORDICOLLIS* Marseul, 1879

Type species: *Anthicus instabilis* W. L. E. Schmidt, 1842

Synonyms: *Bitumicollis* Marseul, 1879; *Cordicomus* Pic, 1894 [RN]; *Laticollis* Marseul, 1879; *Laticomus* Pic, 1894.

Distribution: Palaearctic, Oriental, and Afrotropical regions.

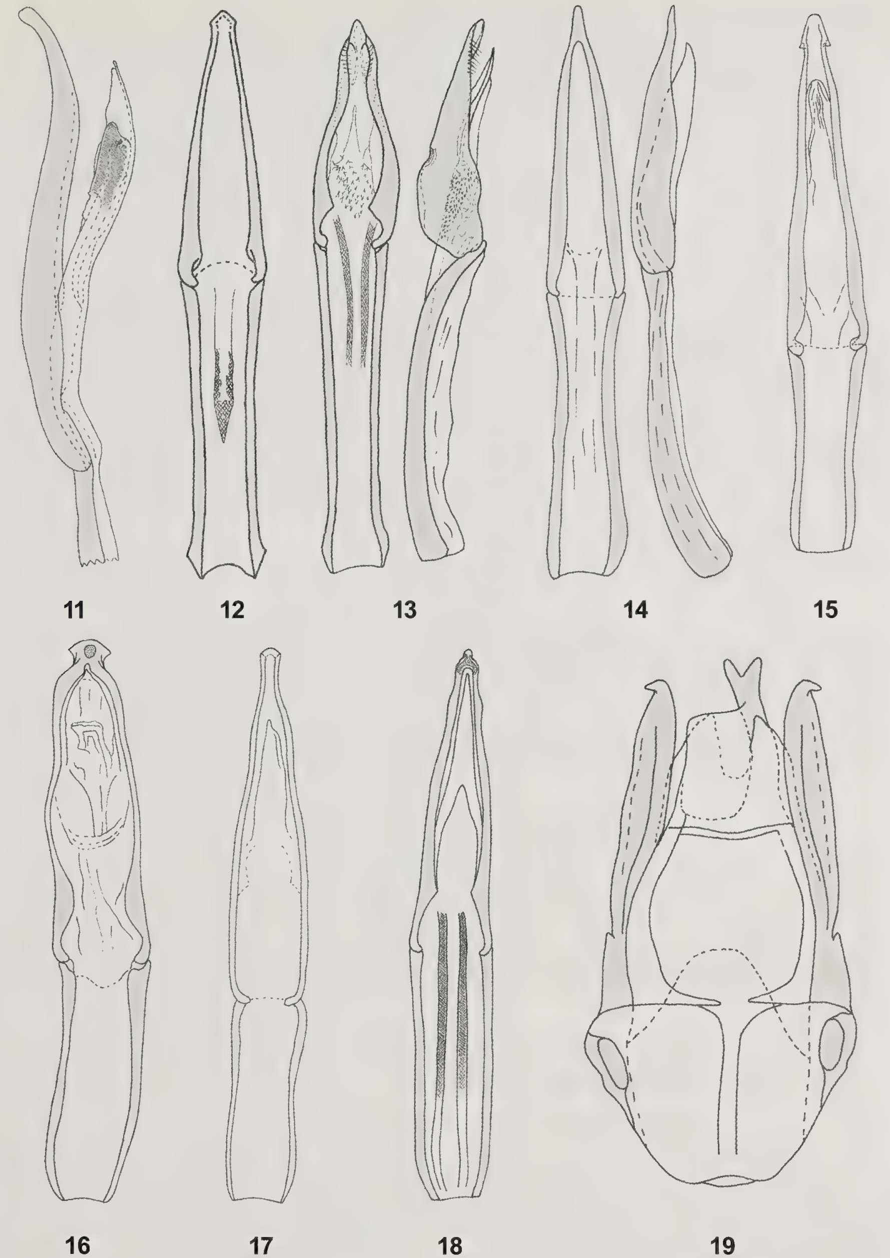
Diversity: About 80 species and subspecies, 40 of which occur in the Palaearctic region.

Cordicollis instabilis instabilis (W. L. E. Schmidt) Plate 7a, Figs. 10 & 11

Description: Length 3.00–4.30 mm. Dorsum yellowish brown to reddish brown, with or without variable darker markings on elytra. Appendages pale-yellow to reddish-brown. Head flattened dorsally, strongly and densely punctate. Eyes large and prominent, temples almost straight. Base of head broadly rounded and medially bluntly pointed. Pronotum anteriorly wider than base, laterally with shallow postmedian constriction; strongly and densely punctate on disc. Elytra subparallel, elongate; Dorsal punctures large and dense, except in apical quarter which is finely and sparsely punctate. Pubescence pale sparse and appressed. Hind wings fully developed. Male metatibiae spatulate near apex.

Ecology and Biology: Salt marshes, sandy habitats on sea shore, under beach debris. Adults and larvae saprophagous. Adults are active from April to November.

Distribution. **U.K.:** Cardiganshire, Dorset, East Kent, East Norfolk, East Suffolk, East Sussex, Isle of Wight, North Essex, South Essex, South Hampshire, West Kent, West Norfolk and West Sussex. **Palaearctic:** Algeria, Croatia, Denmark, Egypt, France, Germany, Great Britain, Greece, Italy, Libya, Malta, Morocco, Norway, Poland, Portugal (incl. Azores Islands & Madeira), Spain (excluding the Canary Islands), south of European Russia, Sweden, Switzerland, Tunisia and Ukraine.



Figs. 11–19. Aedeagal figures of Anthicidae after Bucciarelli (1980), unless stated otherwise. 11: *Cordicollis instabilis instabilis*. 12: *Cyclodinus constrictus constrictus*. 13: *Cyclodinus salinus salinus*. 14: *Hirticollis hispidus*. 15: *Omonadus bifasciatus*. 16: *Omonadus floralis*. 17: *Omonadus formicarius formicarius*. 18: *Stricticollis tobias*. 19: *Notoxus monoceros*.

Genus *CYCLODINUS* Mulsant & Rey, 1866

Type species: *Anthicus humilis* Germar, 1824

Synonyms: *Cyclodinus* Mulsant, Rey, 1866b [H]; *Lagenicollis* Marseul, 1879; *Spinicornes* Krekich-Strassoldo, 1919; *Spiniferes* Pic, 1911; *Thicanus* Casey, 1895.

Distribution: Palaearctic, Oriental, Afrotropical, Nearctic and Neotropical regions.

Diversity: About of 90 species and subspecies, of which 75 occur in the Palaearctic region.

Cyclodinus constrictus constrictus (Curtis) Plate 7b & c, Fig. 12

Description: Length 2.00–2.70 mm. Dorsum colour variable, from reddish brown to almost black, often with indistinct or completely absent pale spots in postbasal and postmedian areas of elytra; pale spots often narrowly interrupted at suture. Head slightly convex dorsally, densely punctate; eyes large, base of the head subconical, with subparallel short temples. Pronotum widened at anterior margin, laterally constricted behind the middle, with two small tubercles before narrowed base; disc densely punctate. Elytra elongate, without postbasal transverse impression, sparsely punctate. Dorsal pubescence consists of sparse, whitish, appressed setae. Hind wings fully-developed.

Ecology and Biology: Sandy microhabitats, such as sea shore, riverbanks, salt marshes. Adults and larvae saprophagous and are active from February to September. Probably all previous records of *Cyclodinus humilis* (Germar, 1824) from the British Isles refer to *C. constrictus*. The subspecies, *C. constrictus subconvexus* Rey, 1892 occurs in France. An interesting atypical specimen, being an almost completely black colour form of *C. c. constrictus* was collected on Havergate Island RSPB Reserve, East Suffolk by M. G. Telfer (Plate 7c).

Distribution. **U.K.:** Dorset, East Cornwall, East Kent, East Norfolk, East Suffolk, East Sussex, Isle of Wight, North Essex, South Devon, South Essex, South Hampshire, Surrey, West Kent, West Norfolk, West Suffolk and West Sussex. **Ireland**: Wexford. **Channel Islands**: Herm. **Palaearctic:** Algeria, Azerbaijan, Bulgaria, Croatia, Egypt, France, U.K., Greece, Ireland, Italy, Jordan, Malta, Macedonia, Morocco, Norway, Portugal (excluding Azores Islands & Madeira), Slovenia, Spain (including Canary Islands), south of European Russia, Tunisia, Turkey and Ukraine.

Cyclodinus salinus salinus (Crotch) Plate 7d, Fig. 13

Description: Length 2.20–3.00 mm. Dorsum dark brown to almost black. Antennae, tibiae and tarsi pale brown to yellowish brown. Dorsum, especially head and pronotum, densely but finely punctate. Base of head slightly elongated, medially bluntly pointed; eyes rather small. Pronotum widened at anterior margin, laterally constricted behind the middle, with two small tubercles before narrowed base. Elytra elongate, sparsely punctured, without postbasal transverse impression. Dorsal pubescence of sparse, fine, whitish, appressed setae. Hind wings fully-developed.

Ecology and Biology: Salt marshes, often in plant detritus. Adults are active from May to September. Listed as Nationally Notable A in Hyman (1992).

Distribution. **U.K.**: Dorset, East Kent, East Suffolk, Isle of Wight, North Hampshire, South Hampshire, West Kent and West Sussex. **Palaearctic:** France, Great Britain, Italy, Portugal and Spain.

Genus *HIRTICOLLIS* Marseul, 1879
Type species: *Notoxus quadriguttatus* Rossi, 1792
Synonyms: *Hirticomus* Pic, 1894 [RN].
Distribution: Palaearctic, Oriental and Afrotropical regions.
Diversity: Eight species, of which seven occur in the Palaearctic region.

Hirticollis hispidus (Rossi) Plate 7e, Fig. 14

Description: Length 2.40–3.10 mm. Dorsum glossy black, pronotum red to orange; elytra with a broad pale macula in the postbasal transverse impression; appendages yellow, yellowish-brown to reddish. Dorsum large and deeply punctured and covered (including femora and tibiae) with extremely long erect pubescence. Eyes large, weakly prominent. Temples parallel, base broadly rounded. Pronotum short, anteriorly slightly wider than base. Elytra subparallel, with very shallow postbasal transverse impression. Hind wings fully-developed.

Ecology and Biology: Prefers diverse open xeric habitats and sea shore, occasionally occurring in orchards. Adults and larvae are saprophagous. Adults are active from March to October.

Distribution. **Channel Islands**: Guernsey, Jersey. **Palaearctic**: Afghanistan, Albania, Armenia, Austria, Azerbaijan, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Egypt, France, Germany, Greece, Hungary, Iran, Israel, Italy, Jordan, Kazakhstan, Kirghizia, Latvia, Lebanon, Malta, Macedonia, Moldova, Norway, Poland, Portugal (including Madeira, not on Azores Islands), Romania, Russia (south of European part & West Siberia), Saudi Arabia, Slovakia, Spain (including Canary Islands), Sweden, Switzerland, Syria, Tadzhikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan and former Yugoslavia.

Genus *OMONADUS* Mulsant & Rey, 1866
Type species: *Meloe floralis* Linnaeus, 1758
Synonyms: *Hemantus* Casey, 1895; *Omonadus* Mulsant, Rey 1866b [H]; *Trapezicollis* Marseul, 1879; *Trapezicomus* Pic, 1894; *Trapezonotus* Sahlberg, 1913.

Distribution: Cosmopolitan.

Diversity: About 40 species and subspecies, of which 21 occur in the Palaearctic region.

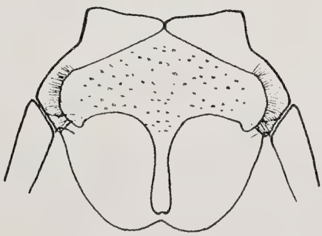


Fig. 20 *Omonadus* mesosternum (after Werner & Chandler, 1995).

Omonadus bifasciatus (Rossi) Plate 7f, Fig. 15

Description: Length 2.50–3.00 mm. Dorsum shiny, black to brown, often with indistinct pale spots in postbasal and postmedial areas of elytra, spots broadly interrupted at suture. Pronotum paler than head, pale brown or reddish. Appendages yellowish-brown to reddish, femora darker than tibia and tarsi. Head dorsally slightly convex; eyes large, weakly prominent. Temples subparallel, head base broadly rounded and slightly impressed medially. Dorsal punctures fine and sparse on head. Pronotum trapezoidal, slightly constricted laterally towards narrower base, dorsally slightly convex, pronotal punctures larger than on head. Elytra elongate, with very shallow postbasal transverse impression; punctures large in basal half, becoming smaller in apical half; pubescence whitish, short and sparse, appressed. Pubescence of sparse long and erect tactile setae on elytra, pronotum and head. Hind wings fully developed.

Ecology and Biology: Various xeric habitats. Adults are active from March to August, one record in February. Listed as Nationally Notable B in Hyman (1992).

Distribution. **U.K.**: Cambridgeshire, East Sussex, Leicestershire (with Rutland), Oxfordshire, West Norfolk, West Sussex and Warwickshire. **Palaearctic:** Afghanistan, Algeria, Armenia, Austria, Azerbaijan, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, France, Georgia, Germany, Great Britain, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Kirghizia, Macedonia, Morocco, Poland, Portugal (excluding Azores Islands & Madeira), Romania, south of European Russia, Slovakia, Spain (not on Canary Islands), Sweden, Switzerland, Tunisia, Turkey, Turkmenistan, Ukraine and Uzbekistan.

Taxonomy: The type series of *Omonadus bifasciatus* ab. *dorothyae* Donisthorpe, (1935a) was examined from the collections of the Natural History Museum. London. Although aberrations are excluded from the International Commission on Zoological Nomenclature (Article 1.3.4.) (ICZN, 1999) it was important to verify the status of this form. The type specimen (label data below) was examined and found to be conspecific with *Omonadus bifasciatus* (Rossi, 1792).

Material examined: Oxford 21.VII.35 [handwritten on the card under the beetle] / Type [printed, label circle, red border] / H. Donisthorpe. B. M. 1934–4. [printed].

Omonadus floralis (Linnaeus) Plate 8a, Fig. 16

Description: Length 2.50–3.70 mm. Colour variable, dorsum reddish-brown to almost black, only pronotum and basal third of elytra reddish; appendages paler than body, femora nearly always darker than tibiae and tarsi. Head dorsally slightly convex, with minute and sparse punctures; eyes large, weakly prominent. Temples slightly widened towards the truncate base, which is medially slightly impressed. Pronotum dorsally slightly convex, medially with two small glossy tubercles on anterior margin; minutely punctate; laterally distinctly constricted towards narrowed base. Elytra elongate, slightly convex, dorsally punctures sparser, but larger than on pronotum and head; postbasal transverse impression very shallow, often almost absent. Hind wings fully-developed. Dorsal pubescence whitish, very short and sparse, appressed; short erect tactile setae very sparsely distributed over entire surface.

Ecology and Biology: Ubiquitous, saprophagous species, adults and larvae often in plant detritus, occasionally found on plants. Adults are active from March to October, some records also in December (presumably hibernating adults).

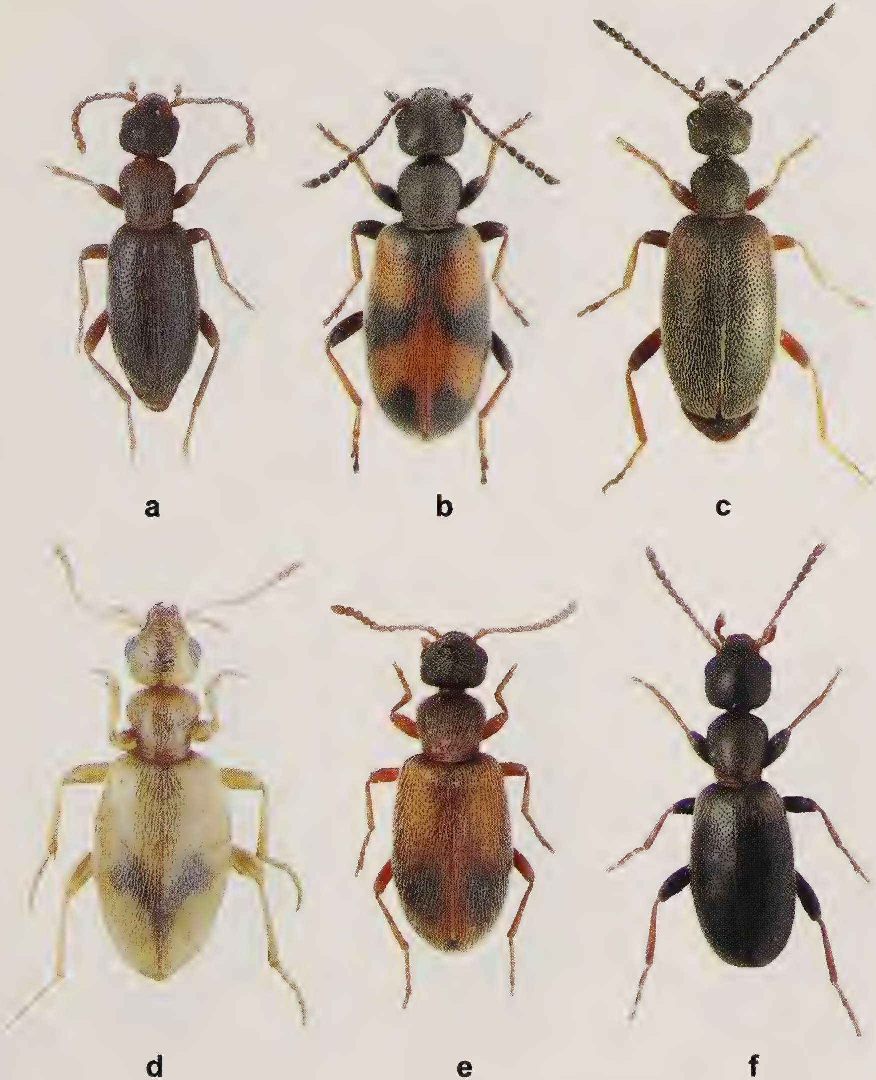


PLATE 6

a: *Anthicus angustatus* 2.4–2.7 mm. b: *Anthicus antherinus antherinus* (typical form). c: *Anthicus antherinus antherinus* (dark form) 2.80–3.65 mm. d: *Anthicus bimaculatus* 2.95–4.10 mm. e: *Anthicus flavipes flavipes* 2.0–2.7 mm. f: *Anthicus tristis schaumii* 2.3–3.0 mm.

PLATE 7
a: *Cordicollis instabilis instabilis* 3.0–4.3 mm. b: *Cyclodinus constrictus constrictus* (typical form) 2.0–2.7 mm. c: *Cyclodinus constrictus constrictus* (dark form) 2.0–2.7 mm. d: *Cyclodinus salinus salinus* 2.2–3.0 mm. e: *Hirticollis hispidus* 2.4–3.1 mm. f: *Omonadus bifasciatus* 2.5–3.0 mm

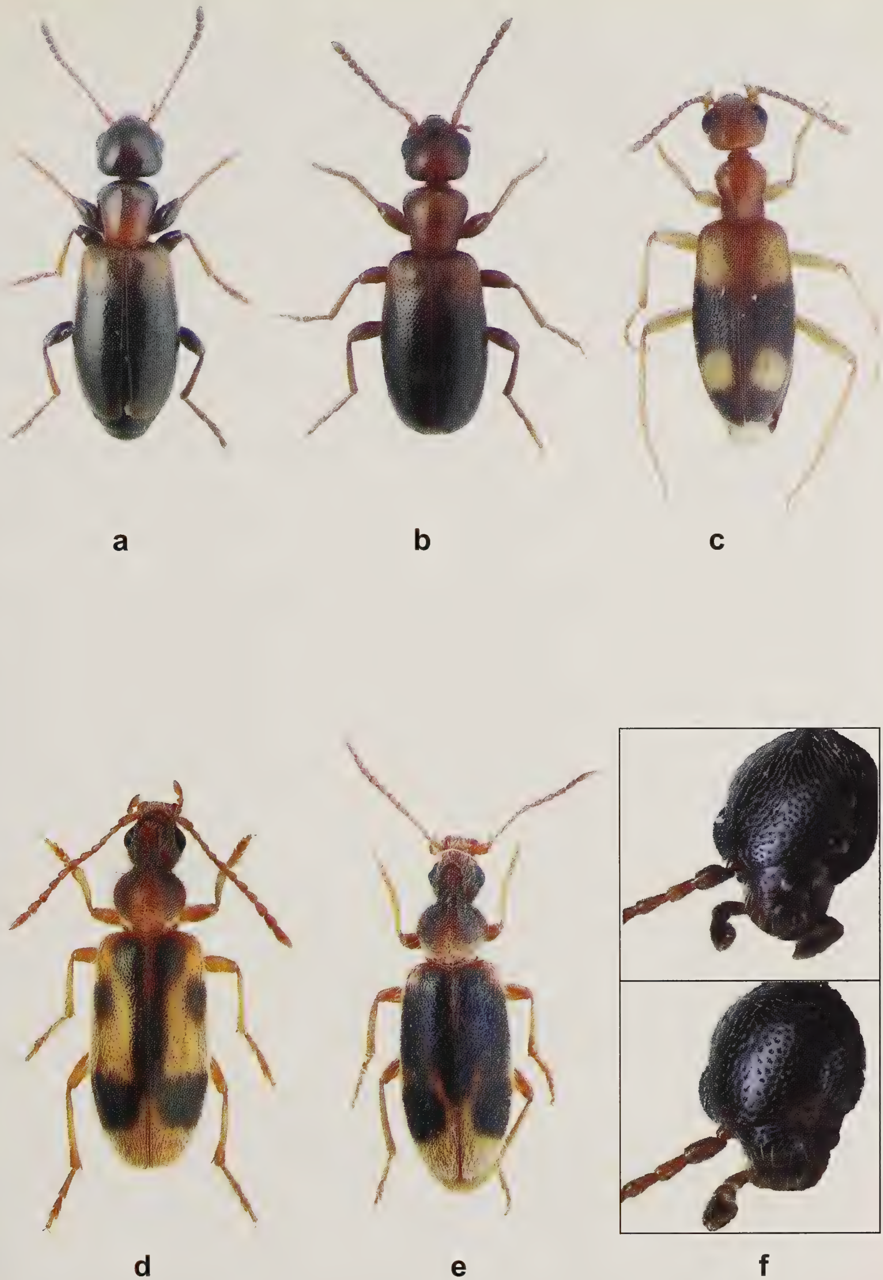


PLATE 8

a: *Omonadus floralis* 2.5–3.7 mm. b: *Omonadus formicarius formicarius* 2.7–3.7 mm. c: *Stricticollis tobias* 3.0–4.5 mm. d: *Notoxus monoceros* (typical form) 4.0–5.2 mm. e: *Notoxus monoceros* (dark form) 4.0–5.2 mm. f: Puncturation of dorsal head and two basal antennomeres of *Cyclodinus salinus salinus* (upper) and *Cyclodinus constrictus constrictus* (lower).

Distribution. Cosmopolitan.

U.K.: Anglesey, Bedfordshire, Berkshire, Breconshire, Buckinghamshire, Cambridgeshire, Cardiganshire, Carmarthenshire, Caernarvonshire, Cheshire, Cumberland, Denbighshire, Derbyshire, Dorset, Dumfriesshire, Durham, Easterness, East Cornwall, East Kent, East Norfolk, East Suffolk, East Sussex, Elgin, Glamorgan, Herefordshire, Hertfordshire, Huntingdonshire, Isle of Wight, Merionethshire, Middlesex, Monmouthshire, North Devon, North-East Yorkshire, North Essex, North Hampshire, North Northumberland, Oxfordshire, Pembrokeshire, Radnorshire, Shropshire, South Devon, South Essex, South Hampshire, South Lancashire, South-West Yorkshire, South Wiltshire, Surrey, Warwickshire, Westmorland, West Cornwall, West Gloucestershire, West Kent, West Norfolk, West Suffolk, West Sussex and Worcestershire. **Ireland**: Present. **Channel Islands**: Brecqhou, Guernsey, Herm and Jersey.

Omonadus formicarius formicarius (Goeze) Plate 8b, Fig. 17

Description: Length 2.70–3.70 mm. Colour variable, dorsum reddish-brown to almost black, only pronotum and basal third of elytra reddish; appendages paler than body, but femora not always darker than tibiae and tarsi. Head dorsally slightly convex, minutely, but densely punctate; eyes large, weakly prominent, temples subparallel. Pronotum dorsally slightly convex, minutely and densely punctate; laterally distinctly constricted toward narrowed base. Elytra elongate, dorsally slightly convex, punctation slightly more sparse and larger than on head and pronotum; postbasal transverse impression very shallow, often almost absent. Hind wings fully developed. Dorsal pubescence short and appressed, whitish; slightly longer erect tactile setae sparsely distributed over the entire surface.

Ecology and Biology: Ubiquitous, saprophagous species, adults and larvae often in plant detritus, occasionally on wild plants. Adults are active from March to October.

Distribution. Cosmopolitan.

U.K.: Berkshire, Caernarvonshire, Cambridgeshire, Cheshire, Cumberland, Derbyshire, Dorset, Dumfriesshire, Durham, East Kent, East Norfolk, East Suffolk, East Sussex, Elgin, Glamorgan, Herefordshire, Middlesex, Midlothian (Edinburgh), North-East Yorkshire, North Essex, North Hampshire, Northamptonshire, North Northumberland, Oxfordshire, Pembrokeshire, South Essex, South Hampshire, South Lancashire, Surrey, Warwickshire, West Gloucestershire, West Kent, West Norfolk, West Sussex and Worcestershire. **Ireland**: Present. **Channel Islands**: Guernsey and Jersey.

Genus *STRICTICOLLIS* Marseul, 1879
Type species: *Anthicus longicollis* W.L.E.Schmidt, 1842
Synonyms: *Stricticomus* Pic 1894 [RN]; *Sulcicollus* Marseul, 1879.
Distribution: Cosmopolitan.
Diversity: About 50 species and subspecies, of which 38 occur in the Palaearctic region.

Stricticollis tobias (Marseul) Plate 8c, Fig. 18

Description: Length 3.00–4.50 mm. Head, pronotum and basal third of elytra yellow to yellowish orange; elytra black in the apical two-thirds with a pair of round to oval pale spots near apical margin; appendages yellow or orange. Head dorsally

flattened, minutely but densely punctate. Eyes large, prominent; temples short, head rounded at base. Pronotum with distinct postmedian lateral transverse impression. Elytra elongate, lacking distinct postbasal transverse impression. Hind wings fully-developed. Pubescence mostly whitish or yellowish (darker on dark parts of elytra), quite long, sparse and appressed. In postbasal third of elytra, hairs directed obliquely laterally. Legs long and slender.

Ecology and Biology: Urban landscapes, often on rubbish dumps, also on sandy sea shores. Adults and larvae are saprophagous. Prefers open, sunny microhabitats. Adults are active from June to October.

Distribution. Cosmopolitan.
U.K.: Anglesey, Bedfordshire, East Norfolk, East Sussex, Hertfordshire, Leicestershire, Middlesex, South Hampshire, South Lancashire, Surrey, West Kent, West Norfolk and West Sussex [possible i].

Genus *FLOYDWERNERIUS* Telnov, 2003
Type species: *Formicomus australis* King, 1869
Distribution: Australasian region.
Diversity: Approximately ten species.

Floydwernerius australis (King)

Description: Length 2.50–2.70 mm. Body dull dark brown to black, elytra with pale yellowish to whitish postbasal and postmedian bands interrupted at suture; pronotum elongate and slightly widened anteriorly; elytral disc flattened; pubescence dense and appressed, pale brown in colour.

Ecology and Biology: Found once in a London warehouse (Richards & Herford, 1930), probably not able to survive out of doors in Britain. Imported species from Australia. No records for more than 50 years. Not included in key.

Distribution. **Australasian:** Australia (incl. Tasmania). **Palaearctic**: Great Britain [i]. **England**: London [i].

SUBFAMILY NOTOXINAE Stephens, 1829, the monoceros beetles
Distribution: Cosmopolitan.
Diversity: 7 genera, about 400 species.

Genus *NOTOXUS* Geoffroy, 1762
Type species: *Attelabus monoceros* Linnaeus, 1760
Synonyms: *Ceratoderus* Blanchard, 1845; *Monocerus* A. Villa & J. B. Villa, 1833.
Distribution: Cosmopolitan.
Diversity: About 300 species and subspecies, of which 62 occur in the Palaearctic region.

Notoxus monoceros (Linnaeus) Monoceros beetle Plate 8d & e, Fig. 19

Description: Length 4.0–5.20 mm. Upperside yellowish brown with variable black markings on elytra, usually consisting of two oval postscutellar spots, dark suture (sometimes connected with postscutellar spots), two oval lateral spots in basal third and one pre-apical transverse band with posterior margin deeply emarginate along the suture; elytra sometimes nearly complete black or with black markings reduced. Head with large prominent eyes, covered by anterior part of pronotum. Pronotum

globose. Pronotal horn long, laterally strongly dentate (Fig. 1). Elytra elongate, densely punctate. Elytral apices notched in males. Hind wings fully-developed. Pubescence long and dense, but appressed, pubescence white or yellowish on pale surface, black on dark surface. Numerous long erect to semi-erect tactile setae over entire surface.

Ecology & Biology: Open areas (meadows, fields, sea shore and near water bodies, forest edges, wasteland etc.), most often on sandy ground. Adults mainly saprophagous, but also a facultative anthophilous species, found on Brassicaceae and also *Rumex* spp. (Polygonaceae). Canthariphilous species which has been observed feeding on secretions of adult Meloidae and Oedemeridae (Fig. 21) in order to obtain and sequester cantharidin (Schültz & Dettner, 1992). Larvae in sandy soil, saprophagous. Adults are active from April to October. In U.K. a frequent colour form with elytra completely black with pale apices and sometimes the epipleura (Plate 8e) is regarded as uncommon on the continental mainland.

Distribution. **U.K.**: Anglesey, Berkshire, Caernarvonshire, Cardiganshire, Carmarthenshire, Cheshire, Cumberland, Denbighshire, East Kent, East Norfolk, East Suffolk, East Sussex, Flintshire, Glamorgan, Isle of Wight, Merionethshire, Midlothian, Monmouthshire, North Devon, North Essex, North Hampshire, North Northumberland, North Somerset, Oxfordshire, Pembrokeshire, Radnorshire, South Essex, South Hampshire, South Lancashire, Surrey, West Cornwall, West Norfolk, West Suffolk and West Sussex. **Channel Islands**: Alderney, Guernsey, Herm and Jersey. **Afrotropical:** Republic of South Africa. **Oriental:** India. **Palaearctic:** Albania, Austria, Belarus, Belgium, Bosnia & Herzegovina, Bulgaria, China (North, East and North-West provinces), Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, U.K., Italy, Kirghizia, Kazakhstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, The Netherlands, North Korea, Norway, Poland, Portugal (excluding Azores Islands & Madeira), Romania, Russia (both European & Asian), Slovakia, Slovenia, South Korea, Spain (excluding Canary Islands), Sweden, Switzerland, Turkey, Turkmenistan, Ukraine, Uzbekistan and Yugoslavia.

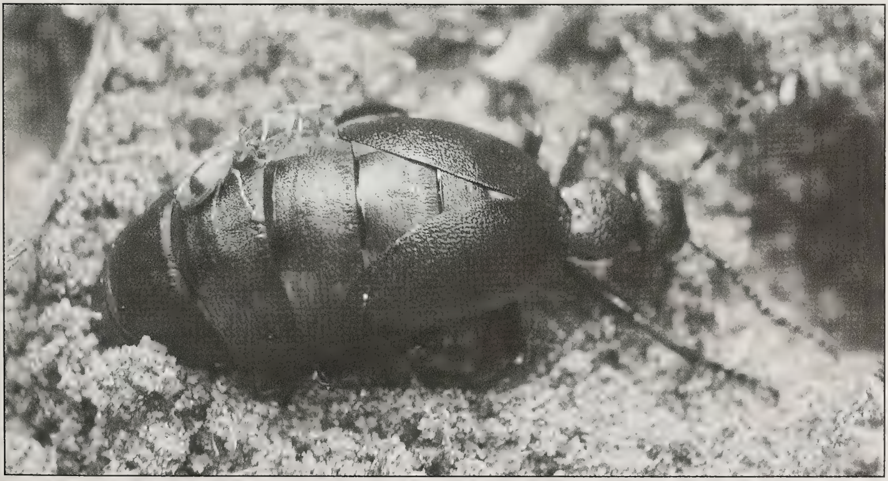


Fig. 21. Individuals of *Notoxus monoceros* clambering over a *Meloe* sp. adult.

Notoxus numidicus (Lucas)

Description: Length 3.30–3.50 mm. Upperside black and shiny, elytra with two very broad yellowish to orange bands in postbasal and postmedian areas, the anterior band is broader, the posterior can also be narrowly interrupted on suture.

Ecology and Biology: Within its native range this species occurs on sandy soils, mainly in coastal and dune zones of the Atlantic and Mediterranean regions. The single British record is from May. Probably an accidentally imported species from South Mediterranean region. The single British example was found in the collections of the Natural History Museum, London and bore the data: Berrow Nr. Burnham Somerset 10.v.65 / On coastal dunes / Notoxus monoceros (Linn.) R. O. Clarke / R. O. S. Clarke B. M. 1970–374. Not included in key.

Distribution. **England**: Somerset [i]. **Palaearctic**: Algeria, Egypt, Great Britain [i], Israel, Libya, Morocco, Syria and Tunisia.

Acknowledgements

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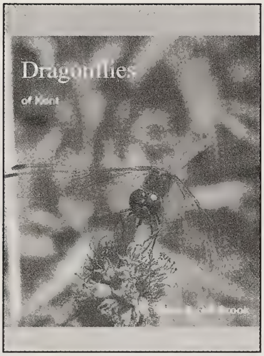
BOOK REVIEW



Dragonflies of Kent by John & Gill Brook. 128pp. (Kent Field Club, 2010). ISBN 978-0-9561926-1-5. £18.00 including p&p, available from Mr R. Moyse, 2 West End Cottages, Doddington, Kent ME19 0BZ.

This is the second book in the newly designed A4 format series published by the Kent Field Club. Both authors are county recorders for dragonflies and well known for their expertise on Odonata. This book is in fact a fully revised and enlarged edition of their previous Atlas published in 2001, which despite its comprehensive coverage was best known for its imperfect Perfect binding, which meant it wasn't all that it was cracked up to be. It is reassuring to report that the new Atlas has hard covers and the book can be opened flat without fear of damage.

The same general format has been followed as before with each individual species account spread over two pages. This covers suborder, family and current species names, tetrad distribution map, detailed species description, habitat and breeding requirements and a short synopsis of the species status and distribution in Kent and the UK. For each species there is at least one full colour photograph, some with up to three to illustrate infraspecific variation, for example among the blue-marked damselflies.

The records used for distributional mapping include those from the previous survey (1980–1999) and more recent survey work covering the period to 2008. As a consequence the degree of coverage has improved (c.85%), yet it is surprising that there are still some largish blank areas on the map along the Downs near Dover and on the Isle of Thanet. The authors state that this does not necessarily indicate that dragonflies do not occur there, or than no surveying has taken place. Most of the tetrads on chalk are 'blank' because there are few permanent waterbodies except for the occasional farm and garden ponds which are difficult to access. The Isle of Thanet is both on chalk and intensively cultivated – far from ideal habitat and a seemingly third of the area has just disappeared under glass, proudly acclaimed as Britain's largest glasshouse complex. Three symbols are used: a yellow dot for a sighting of an adult, an orange dot for breeding where just mating, egg laying or larvae have been observed, and a red dot for successful breeding where exuviae have been found (NB, exuviae is f. plural, meaning discarded clothes or shed skins (e.g. of a snake). There is an unfortunate tendency to anglicise the Latin and quote exuvia in a non-existent singular as in the new New Naturalist book on Dragonflies which is to be avoided). The change to A4 means the maps are much easier to understand.

There are now 40 species of Odonata recorded from Kent: 27 residents, seven migrants, four historical species and two accidental introductions. The newest species are *Lestes viridis* (Vander Linden), *Lestes barbarus* (Fabr.) and *Erythromma viridulum* (Charpentier). It is nice to note that the Small Red-eyed damselfly *E. viridulum* is now breeding in the lake at Bluewater Shopping Centre, thereby justifying the place's existence, to males at least.

The authors have also compiled a key to exuviae with numerous diagrams to help the reader. The last section is a gazetteer, with a list of the ten best localities in Kent to observe dragonflies, with photographs and a full listing of species. This in itself will prove a useful historical record in years to come. The atlas also includes many superb pen and ink drawings of dragonflies carefully drawn by the authors. All in all, an excellent book.

JOHN BADMIN

APPARENT DECLINING POPULATIONS AND DISORIENTATION BEHAVIOUR OF HONEYBEES (*APIS MELLIFERA*) IN SOUTHERN ENGLAND AND FRANCE

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A beekeeper always keeps an eye out for bees. The sight and sound of bees is a natural part of the countryside and when that disappears we should all be worried.

I first experienced a motionless honeybee on a flower head in August 2008 in southern France. Other un-reactive honeybees were later seen in late April 2009, small, perfectly formed, hairy, young bees on the ground and also on flowers, as if disorientated. This was totally out of character. Honeybees are usually busy at all times. The weather was warm and sunny and they had not been caught out by a sharp shock of rain. They just sat there without doing anything, proboscis stowed, all energy drained from their young bodies; their abdomens very slightly pulsating indicating they were actually alive. So what had got into them? What had caused this breakdown in their usual behaviour?

Sudden mortality of bees had already been experienced in parts of France in July 1994 and had been written about by Benjamin and McCallum (2009) who explored the involvement of the contact and systemic insecticide imidacloprid. Foraging bees were seen to be "taking long periods of rest on the sunflower heads and appeared agitated, constantly cleaning their antennae and scratching their bodies with their hindlegs" (p. 133). This was different from my own observations where the honeybees were motionless and unresponsive.

Field observations were made on honeybees throughout my travels (wherever I happened to be) in the UK and France in 2009 looking for signs of odd behaviour, or simply recording presence or absence. In the spring of 2009 in southern France (Cévennes) honeybees were active pollinating apple (*Malus domestica*), but not in large numbers. They were easily outnumbered by true flies (Diptera), long-horned beetles (Coleoptera: Cerambycidae) and other species of beetle. The local nectar sources here included tree heath (*Erica arborea*) in the wild and rosemary (*Rosmarinus officinalis*), the latter, as a hedgerow being the most visited by honeybees.

May

Returning to the UK, reports stated that the countryside was being overrun by dandelions (*Daily Mail*, 18th May 2009). My own garden had a large swathe of dandelions, but not a single honeybee on them. I had photographed honeybee on dandelion in France earlier, but insects sometimes have different behaviours in southern France than they do in Britain, probably as a result of temperature influencing nectar flows.

Hawthorn (*Crataegus monogyna*) blossom was at its peak in Week 19 (May 4th) in parts of East Sussex (a week or so later than the warmer towns and cities in the south) but not a single honeybee was on it. By the 14th May just a few honeybees were seen on the blossom but wind and rain ravaged most of the blossom that then deteriorated as a nectar source. In the garden honeybees were to be found nectaring at knapweed (*Centaurea montana*) and *Rosa* 'Scarlet Fire' as usual.

In London, honeybees were completely absent from a long wall of blue *Ceanothus* in the Embankment Gardens next to the Houses of Parliament on the 15th May. This was surprising as the flowers are often a good nectar source.

In Hampshire the next day (16th May) honeybees were working the inflorescences of bistort (*Persicaria bistorta*), and the almost impossible tiny yellow centres of the blue

flowers of water forget-me-not (*Myosotis scorpioides*) – a European native species – but were nowhere else to be seen in the floriferous gardens (including herbaceous borders) of Hinton Ampner which was a surprise. Bumblebees were more in evidence than honeybees, especially on the reliable *Centaurea montana* cultivars. None was seen in a garden in Forest Row (East Sussex border with West Sussex) on the 18th May.

In Yapton and Girling Beach (West Sussex) on 21th May no honeybees were present on usual wayside favourites such as white deadnettle (*Lamium album*), black mustard (*Brassica nigra*), red clover (*Trifolium pratense*), Broad-leaved everlasting pea (*Lathyrus latifolius*), and a large patch of late-flowering hawthorn (*Crataegus monogyna*), and none on a fly-tipped waste pile on red campion (*Silene dioica*), columbine (*Aquilegia vulgaris*), or opium poppy (*Papaver somniferum*), or foxglove (*Digitalis purpurea)*; only hymenopteran relatives the Common carder bee (*Bombus pascuorum* (Scopoli)) and Red-tailed bumblebee (*Bombus lapidarius* (L.)). Overall honeybees were in short supply in this agricultural and glasshouse area – where large fields of potatoes and corn are the major habitats present.

At Scotney Castle (West Kent) gardens on 24th May honeybees were only at one particular rhododendron variety (out of the many hundreds) and also at a tall stemmed wallflower (*Erysimum* cultivar), though surprisingly nowhere else in this flower-rich garden.

June

Few honeybees were in the Oxford Botanic Garden on 1st June, which was extraordinary despite the diversity of nectar sources available. Just one or two were on *Nepeta* × *faassenii* 'Six Hills Giant' (if ever there was a bumblebee attractant this is it – grown as a hedge like lavender), several on *Crataegus*, some on wild mignonette (*Reseda lutea*), and some were working the dangly stamens of Jacob's ladder (*Polemonium brandegeei*) obliging honeybees to hover without alighting to gather pollen. There were, as usual, plenty more bumblebees present than honeybees in the garden, including the new noughties arrival, the distinctive Tree bumblebee *Bombus hypnorum* (L.) (working the white flowers of the large dense-headed tree of *Crataegus* × *lavallei*) but overall one had to work hard to find honeybees where one expected them most.

On the following day honeybees were absent from a crop of field beans in the Hertfordshire countryside, though they were probably not far away in the fading fields of oilseed rape.

Buttercups covered a lot of my garden by 5th June but were completely ignored by honeybees. It was reported in the press that populations of buttercups were exploding (*Daily Mail*, 4th June, 2009). It was a very rare occasion that I tracked a honeybee on a buttercup but that was close to a hive and may have been exploratory.

I thought The Royal Horticultural Society Garden at Wisley (Surrey) would be a honey-pot for honeybees (it has been in the past) but it was very difficult finding any bees in the garden on the 5th June. The herbaceous border was very much behind that of Oxford, but still did not harbour any honeybees. One or two were found in fresh rose flowers (particularly *Rosa* 'Cornelia') and some were 'frozen' on *Philadelphus* 'Belle Etoile' – a casualty of a recent bout of rain and cold snap. Numerous bumblebees and cuckoos were transfixed on *Nepeta*.

No honeybees at all were present in the extensive and colourful garden of Ston Easton Park (Somerset) on 6th June, with none to be seen along the herbaceous border. Again plenty of bumblebees, especially on comfrey (*Symphytum* × *uplandicum* cultivar), an occasional nectar source for honeybees. None were seen in a white clover (*Trifolium repens*) field in Langridge (Somerset) on the same day.

Buddleja globosa was out by 7th June in my own garden (much later than in towns) and honeybees were at last on one reliable nectar source available to make observations.

A visit to Sissinghurst (26th June) restored my faith in finding honeybees at regular and fairly predictable nectar sources, i.e. in gardens, where they were present on *Phacelia, Eryngium, Malva* and *Epilobium* but then Sissinghurst was doing its bit for bees by having two active hives in the orchard.

July

Honeybees were hard to find in Walland Marsh (Kent) on 16th July along the roadside verges and hedgerows of this much improved landscape, but just a few were on late flowering bramble (*Rubus* complex).

On 26th July in the gardens of Belvoir Castle (Leics) there were just a few honeybees on Prairie mallow (*Sidalcea* sp.) and St Peter Port daisy (*Erigeron karvinskianus*). There were more honeybees drinking from sugary soft drink bottles on tables at the Game Fair than in any garden display. This is an artificial habit not now exclusively held by wasps (*Vespula* sp.) in car parks in the UK and on the continent. Honeybees have become scavengers too. Bumblebees were abundant at Belvoir, over 300 on a 20 m stretch of Lavender (*Lavendula officinalis*) in full bloom – all incapacitated due to summer showers – but not a single honeybee.

In the evening of the 27th July in my Sussex garden late returners (i.e. after 2100 h when it was still warm) to the hive were lugubrious and disinclined to enter, some alighting and waiting to enter, others tumbling over each other to get in, in a kind of intoxicated manner. Where had they been? What had they been imbibing?

July was very much a wet month and this can put an end to the main foraging period of honeybees as they can be confined to the hive during periods of bad weather. Such a condition was noted by one Edward Jesse who wrote in 1818 that "Bees almost entirely confine themselves to their hives during the finest days of the latter part of this month, owing to the want of flowers".

On 29 July 2009 honeybees in my garden were active in the morning, but confined to the hive, despite some nectar sources being available (*Rubus, Lonicera, Buddleja*). Jesse had said that in 1818 on 26th July that "Flowers of every description have entirely disappeared".

Discussion

The apparent lack of honeybees is worrying. Quite whether the absence of bees and their disorientation observed are due to poisoning or some other factor is impossible to determine without careful study.

The many reasons posited for the demise of honeybees – Colony Collapse Disorder (CCD) – vary from viruses transmitted by mites (including *Varroa* sp., Fig. 1) that leave the bees paralysed (Planet Earth, 2009) as well as bacteria, fungi, stress, mobile 'phone transmitters, insecticides and genetic fitness. Buglife – The Invertebrate Conservation Trust reported on the plight of honeybees in their Press Release of 9 September 2009 (Buglife, 2009).

Honeybees should be active most of the time, but sleep and the effects of poisoning or disorientation could be confused. Sleep "can be by a posture reflecting a lack of muscle tonus, in which the antennae hang down, and the legs are folded beneath the body." (Tautz, 2008). Johansen (1979) was certain that . . . "bees behaving as if they are chilled, crawling around in front of the hive, is an almost sure sign of carbaryl (Sevin) poisoning. Bees exposed to this chemical quickly lose the ability to fly . . .".

Also, the honeybees' disorientation behaviour should not be confused with the ordinary behaviour of returning honeybees, a small proportion do not alight first of

Fig. 1. *Varroa* sp. (Acari: Varroidae), displayed in relation to the hindleg of the honeybee for size comparison; now an established ectoparasitic pest of honeybees in the UK.

all on the alighting board, some come to rest within half a metre of the entrance and then make the extra effort to fly again at the entrance when they are ready. As was said as early as 1609 "when Bees come laden and weary home, they maie fettle quietlie." (Butler, 1609).

It is worth pointing out that a solitary Hornet (*Vespa crabro* L.) was seen on the ground on 11th August in Hailsham (East Sussex). This was displaying the same un-responsive symptoms as seen in the UK and France for honeybees – a fresh specimen, motionless and totally un-reactive to anything in its close proximity (most unusual for a hornet). One wonders whether this un-known affliction is also having an effect on hornets. This would be a pity since that species has enjoyed a steady increase in numbers in this part of East Sussex during the last decade.

What can be gleaned from this very small, un-quantitative snapshot of the state of honeybees is that they are becoming hard to find when previously they were widespread. Although honeybees are not always present in gardens as they used to be, gardens are probably a better place to find them than the countryside. This is almost certainly due to the biodiversity within gardens being far superior to that of the countryside. Honeybees will perhaps be saved in the long term by garden biodiversity.

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WHEN BEES EXPLOIT PLANTS: NECTAR ROBBERY

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The amazing variety and beauty of flowers we see in our gardens is partly due to the relationship between plants and their pollinators. Through millions of years of evolution, insects have adapted to use flowers and plants have adapted to use insects. By producing a sugary reward in the form of nectar, plants attract insects to their flowers and use those insects to carry their pollen. The plants benefit from having their pollen spread over greater distances and with much more accuracy than if transported by wind. The insects benefit by gaining a source of high energy food in the form of nectar. This relationship can then be considered a mutual one, with both groups gaining an advantage from the interaction.

In every mutualism, however, there may be opportunities to take advantage of the situation. Normally there is 'give and take', but sometimes one half of the relationship may just 'take'. For example, there are several orchid species with non-rewarding flowers which do not produce any nectar, but the pollinators still respond to these flowers without gaining any reward. The non-rewarding orchids 'cheat' the insects by not wasting energy on producing nectar, but still benefit from pollination (see March 2010 journal front cover showing fly orchid and its pollinator).

There is another example of a 'cheater' taking advantage of the situation, but with the roles reversed. Some species of bees have learnt to steal nectar from flowers without pollinating them. To do this, the bee will make a hole in the flower near to the source of the nectar. This makes it possible for bees with short tongues to reach nectar in long flowers which would normally be too deep to reach. The bee will then use the hole to extract the sugary reward without going near the stigmas and stamens. This behaviour is described as nectar robbery. You may have seen bumble bees doing this in your garden as it has been observed on several different types of plants, including red campion (*Silene dioica*), bleeding heart (*Dicentra spectabilis*), *Fuchsia,* and common yellow toadflax (*Linaria vulgaris*). Even Charles Darwin observed robbery of broad bean flowers and mentions robbery of azalea and honeysuckle flowers. Examples of species of nectar robber include the bumble bees *Bombus terrestris* (L.) and *B. jonellus* (Kirby) both found in Europe. Looking for evidence of robbery is quite simple. If flowers have been robbed, they will usually have a neat circular or semi-circular hole near their base, close to where the nectar is produced. Once holes have been made by the robbers, other insects may also use them. For example, honeybees and ants have been seen using holes made by bumble bees.

Directly damaging the flowering parts of a plant would appear to be detrimental to the plant and in some situations nectar robbery may reduce the numbers of seeds produced. Robbery also reduces the amount of nectar in flowers which can make the flowers less attractive to true pollinators, which in turn may reduce pollination of those flowers. But the holes made by robbery can encourage other insects to feed from flowers which would otherwise be inaccessible, encouraging a greater diversity of insects.

Although there have been many studies on nectar robbery, there have been few in the British Isles. I am currently involved in a study into robbery of red campion (*Silene dioica*) by a short tongued bumblebee, *B. terrestris* (Figs 1 & 2). At the

Fig 1. *Bombus terrestris* robbing a flower of *Silene dioica*. Photo: M. Austin 2009.

Fig. 2 *Silene dioica* flower showing signs of nectar robbery. Photo: J. Memmott 2009.

University of Bristol we are attempting to understand the patterns of robbery in this wildflower and are looking for people across the British Isles to assist us. This summer I am trying to gain a picture of what levels of robbery are like across the country and I would like volunteers to collect and send information. If you feel you would like to take part in active research and help with the collection of data on nectar robbery see the instructions below.

Plants have lived with insects for millions of years, but in some cases the insects have learnt to exploit the plants they visit by robbing nectar. So look out for signs of robbery on wildflowers or in your garden. And if you see a bumble bee making a hole in a flower, you may be witnessing nectar robbery first hand and catching them in the act.

Instructions for checking robbery levels in red campion

The equipment required is a pen and paper, and it only takes a few minutes to record the data per patch of red campion. Each patch of red campion counts as a single record. You need to be able to recognise red campion and be able to see flowers close up to look for signs of robbery. The main flowering season for red campion is during May and June, but can continue into July.

1. Find a patch of red campion flowers and count the number of open flowers as accurately as you can. Record this as 'number in patch'. For very large or long patches, an estimate to the nearest 10 is sufficient. Ignore small patches of less than 30 flowers.
2. Choose any 30 open flowers, ideally choose flowers that are spread across the patch, and check for signs of robbery. Record the number of robbed and unrobbed flowers. e.g. 25 robbed 5 unrobbed.
3. From the list below, choose a habitat which best describes where the patch is found, selecting from:
   - Woodland
   - Woodland edge
   - Hedgerow
   - Grassland
   - Other, please describe
4. List any other common flowers close to the red campion.
5. Please state the location of where the patch was recorded, e.g. A postcode, grid reference or address, and the date you checked the flowers.

Please email results to *Nic.Charlton@bristol.ac.uk*

Additionally, if you see any bees in the act of robbing, please send details of the species and the location.

SHORT COMMUNICATION

***Dipogon bifasciatus* (Hymenoptera: Pompilidae) and *Crossocerus styrius* (Sphecidae) in Staffordshire**. – The spider-hunting wasp *Dipogon bifasciatus* (Geoffroy in Fourcroy) is best known from wooded downland in south-eastern England, but there are a few records further north (Collins, 2005). Modern records (1970–2004) are known from just 12 hectads and the species has British Red Data Book status (Shirt 1987, confirmed by Falk, 1991). It nests in old insect burrows in dead wood, but cavities in walls may also be used. The Herbert Museum and Art Gallery, Coventry, has specimens collected by Harold Daltry on Cannock Chase (SJ9917) in 1938 and 1939 (C. Slawson, pers. comm.). Its continued presence in the Midlands was confirmed by a record from an open parkland site in Derbyshire (Alexander, 2002) and a second Staffordshire site can now be added: a single female was found investigating a sun-lit standing dead pine trunk on the edge of Threap Wood, Alton (SK0542), 6.viii.2009.

Crossocerus styrius (Kohl) is a small black solitary wasp about which very little is known (Smith, 2009). It has been associated with open, deciduous woodland, especially damp woodland although is often associated with dappled shade along river corridors. It is widespread across the southern counties but is very rare further north. Like the *Dipogon* it was known in Staffordshire only from an old record – it was reported by Harry Britten from 'Madeley' (SJ7744), which is where Daltry lived (C. Slawson, pers. comm.). Its continued presence in the county was demonstrated when a female was swept from a shady seepage in broad-leaved woodland on the edge of Threap Wood, 20.x.2009.

Threap Wood forms part of the Dimmings Dale and The Ranger SSSI designated for its rich invertebrate fauna and bryophyte flora. The discovery of two rare wasps emphasises the quality of this area. – KEITH N. A. ALEXANDER, 59 Sweetbrier Lane, Heavitree, Exeter EX1 3AQ.

ACKNOWLEDGEMENTS

The visits formed part of Common Standards Monitoring work within the SSSI and was organised by Tom Holland of Natural England. The *Crossocerus* was kindly identified by Mike Edwards. Thanks to Craig Slawson, Staffordshire Ecological Record, for information on the old records.

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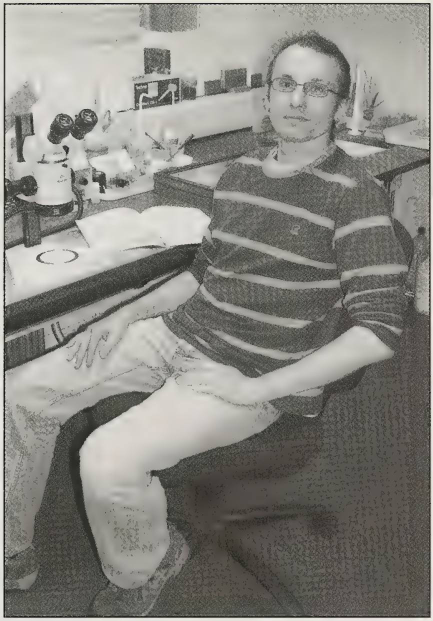
DARREN J. MANN



BENHS President 2010–2011

Terry Denman, my teacher gave me four hissing cockroaches when I left junior school, and I doubt he realised at that time that he had unleashed a passion (some would say obsession) for insects that is still with me today. I was unfortunate enough to be born and raised in Coventry; however the one saving grace of that awful city was the Herbert Art Gallery & Museum (HAGM), where as a precocious 15 year old I had two weeks work experience with Adam Wright and Chris Palmer. After day one I had decided I wanted to be a museum entomologist and returned that summer to volunteer; in fact they did not get rid of me until I left Coventry to attend university in Plymouth. Adam and Ray Barnett (who had replaced Chris Palmer by then) were joined by Steve Lane and others to form the 'Coventry Ecological Survey', a group of entomologists who were to give me the best entomological education I could have wished for, and I owe much to their early influences. Although cockroaches were my first love, apart from in the restaurants and hospitals, Coventry lacked the objects of my desire, so with the help of the HAGM staff I branched out into sawflies, hoverflies and beetles.

A chance meeting with the eccentric Adrian Durking at an insect show made me realise that there were more people out there interested in cockroaches, so myself, Adrian, Judith Marshall and George Beccaloni formed a club, the Blattodea Culture Group (BCG) which first published its newsletter in 1986 and continues today, if somewhat irregularly. The Amateur Entomologists' Society junior field week of 1986 was the next great adventure, when I spent a week collecting in the New Forest with other like minded kids, some of whom are still good friends. Soon after this event, I was invited, to my great surprise, to join the AES Council and the following year I started to organise AES junior field weeks myself. I am pleased to say that today there are a number of professional entomologists, myself included, whose early development was encouraged by these field trips. After ten years of field weeks and events I stepped down as AES Junior Secretary, though by facilitating the merger of the AES junior section with the Exeter based Bug Club, the group has gone from strength to strength.

My next move, to study on the now defunct postgraduate diploma course in 'Insect Taxonomy and Systematics' at Cardiff University was, as it turns out, the most fortuitous event in my entomological career. This course not only encouraged me to take on challenges in taxonomy and identification, but also introduced me to John Deeming, Ashley Kirk-Spriggs, Mark Pavett and Mike Wilson at the National Museum and Galleries of Wales. Deeming with his infinite knowledge and attention to detail and Kirk-Spriggs with his exceptional curatorial skills provided me with the

foundations to become a 'proper' museum curator. Mike was later to become my boss and encourage my research and curatorial skills, while Mark and I spent every available minute in the field competing for the best catch of the day.

In 1997 I applied for a job as a collections technician at the Hope Entomological Collections, Oxford University Museum of Natural History. Thinking I had no chance of getting it, I had a relaxed and jokey attitude during interview, which suited Steve Simpson and George McGavin, who to my utter amazement offered me the job. As a boss, I could not have had better than George, as not only did he put up with my idiosyncrasies, bad language and jokes, but also gave me encouragement to develop my own research interests and gave me a degree of autonomy to develop the collections.

Although joining the Hope saw my time spent on British entomology dwindle, this was compensated by an increased activity in curation, collections management and dung beetle research. Many years ago, I was asked to review the new RES handbook by Jessop on dung beetles, feeling that I ought to test the keys; I delved in to the world of coprophagous beetles and became a complete addict. Although I am still enthused by the British Scarabaeoidea fauna and go on dung beetle collecting trips across the UK, my research interests broadened in to the taxonomy and ecology of world Scarabaeinae. I have been fortunate enough to travel to several countries to conduct ecological research on dung beetles and have developed collaborative projects with researchers worldwide.

In the thirteen years I have been in the Hope, I have moved a lot of drawers and specimens, pushed a lot of paper, taught a lot of students and collected a lot of dung beetles. Somehow I have managed to creep up the promotional ladder and am now the Assistant Curator. Although with promotion comes more paperwork and less specimen based time, I do have a great collection to play in, a nice office/lab and fabulous staff to help me make the collections here bigger, better and more accessible.

I have been a member of the British Entomological & Natural History Society for many years and have enjoyed using the collections at Dinton and the annual exhibition. I have served on the Council and have hosted the AGM in Oxford a few times. However, when asked to become President of the Society I was still surprised and somewhat flattered. I hope that my experiences with collections and their management and my enthusiasm for insects will be of benefit for the society over my year's presidency.

Notice to Members – new Sales Secretary

Dr Michael Darby, the owner of Malthouse Books, was recently appointed Honorary Sales Secretary by the BENHS Council, replacing Gavin Boyd who has held the post since 1996. Back numbers of the Journal, listed offprints and copies of the Society's publications may be ordered by email from *admin@malthousebooks.co.uk* or by post from Malthouse Books, The Old Malthouse, Sutton Mandeville, Salisbury, Wiltshire SP3 5LZ.

COUNCIL, OFFICERS' AND OTHER REPORTS FOR 2009

Council Report 2009

The Council met on seven occasions during 2009 and all the meetings were held in the South Place Ethical Society's Conway Hall in Holborn. On average the meetings were attended by 16 Council members. The possibility of a change of venue for the meetings was discussed but it was decided that the hall is conveniently located and the room adequate for our purpose despite the occasional distraction of choir practice in the room next door.

The ranks of the Honorary Members have been depleted and, as no new Honorary Members have been appointed for some years, five new Honorary Members were elected. Their names appear in the President's report. Three members, R. Hayward, A.A. Myers and W.G. Tremewan, completed 50 years continuous membership at the end of 2009 and were elected Special Life Members. This increases to 41 the band of faithful members who have each stayed with us for more than half a century. There are also two Honorary Members who joined the Society more than 50 years ago. We wish all these members many further years of membership. Alas 12 deaths were reported to the Society during the year. These included that of Charles MacKechnie-Jarvis at the age of 101. He joined the Society in 1925 and had been made an Honorary Member on reaching his century. The Honorary Secretary represented the Society at a packed funeral service for Charles in St Thomas, Salisbury. We have also lost three Special Life Members, J.F.D. Frazer, G.C.D. Griffiths and C.G. Roche, in the course of the year. The number of resignations during the year was 22 and a further 22 members were struck-off for non-payment of subscriptions. Against these losses 37 new members joined the Society in 2009. Membership at the end of the year stood at 822, a decrease of 19 on the previous year. It seems probable that the financial crisis is causing members to review their subscriptions to this and other societies.

Following several years of discussion Wokingham District Council has at last decided to surrender the under-lease of the exhibition area that adjoins our rooms in the Pelham-Clinton Building for £33,000. This is equivalent to the Society paying a rent of £635 pa for the remaining term of the main lease and your Council believes this represents good value for money. The acquisition of this room will increase our floor space by one third. It will provide much needed extra space for workshops, our own meeting room and some extra storage space. A sub-committee of the Council has been set up to consider how the new space can be used and integrated with our existing rooms. The sale is now in the hands of the solicitors and we hope for completion in Spring 2010.

The Society's programme of talks, workshops and open days has continued. An all day Saturday meeting was held in Rotherham together with The Sorby Natural History Society and the Yorkshire Naturalists Union. The Society's Annual Meeting was once again held in the Oxford University Museum of Natural History and was another all day Saturday meeting. The planned Saturday meeting at the National Museum of Wales, Cardiff had to be cancelled. The joint evening meeting with the London Natural History Society took place at Imperial College in September and was addressed by our member Keith Alexander. Eight workshop meetings were arranged for 2009 and included sessions on Myriapoda and Isopoda, Coleoptera, Diptera, Hymenoptera and Hemiptera. A Coleopterists' Day was held in April. The Society's rooms were opened on 16 days during the year for members' open days. We

should like to thank everyone, speakers, workshop leaders and participants for their support of these events. All these meetings were organised by Ian McLean, our Indoor Meetings Secretary. Paul Waring, the Field Meetings Secretary, produced a list of 21 field meetings for 2009; many were joint meetings with other societies. The majority (15) of these were evening moth trapping meetings and all were in southern England. The field meetings programme reflects those meetings offered to the Society. Offers of more daytime meetings in other parts of the British Isles would be welcomed.

Mike Simmons organised the Annual Exhibition and Dinner which were, once again, held in the Sherfield Building of Imperial College. The attendance book for the exhibition was signed by 220 people, a small increase on the previous year's attendance. For the second year Mr Joe Botting travelled from Yorkshire to photograph selected specimens for the Exhibition Report. The number attending the Annual Dinner continues to fall with only 30 dinners booked this year. A new location or format for the Dinner has yet to be decided. Last year's problems with both the exhibition and dinner, and arising from the college's organisation on the day, were not repeated. The number of societies and other organisations asking for table space at the exhibition is increasing. At present we feel that this is to the benefit of the exhibition and our members and no complaints have been received. The Council is, however, keeping an eye on the situation.

The Society maintains its interest in conservation matters. We responded to a consultation paper from the Joint Nature Conservation Committee (JNCC) on proposals for species to be added or removed from Schedule 5 of the Wildlife & Countryside Act at the Fifth Quinquennial Review of that Act. We now await the response from DEFRA and the Scottish Executive to JNCC's proposals. Our representatives continue to attend the meetings of Invertebrate Link and to contribute to the discussions and decisions of this group. We have had a meeting with Buglife to see if we could resolve some of the differences in approach by the two organisations to insect conservation. Some joint activities were proposed but as yet nothing has come of them. At a time when Buglife is seeking to increase its influence on invertebrate conservation, your Society is concerned that the member organisations of Buglife have no influence on the direction Buglife takes. In the field Mr Miles continues to advise land owners and land managers on site management for the two heathland flies *Thyridanthrax fenestratus* and *Bombylius minor*. He is having increasing success in getting heathland paths, tracks and bare ground managed for these two flies where they occur. This is also beneficial to the many other insect species that inhabit this bare-ground habitat.

Gavin Boyd, our Sales Secretary, has announced that after 14 years he will be stepping down from that post at the 2010 Annual Meeting. The Sales Secretary is one of the unsung heroes of the Society, working away quietly and bringing in several thousands of pounds of sales annually to the Society. This sales income is crucial to the well being of the Society and its future publications. The Council thanks Gavin for his contribution and wishes him well in his return to his Yorkshire roots. Dr Michael Darby has offered to take over as Sales Secretary.

On the matter of resignations you will realise the Honorary Secretary has been persuaded to stay in post for a little longer. He will, however, be retiring at the Annual Meeting in 2012 so a replacement is needed by that date or before.

JOHN MUGGLETON

Treasurer's report 2009
Financial Year to 31 December 2009

This year has been another quiet one for the Society, financially. There has been no new publication and no capital expenditure. As a result of our policy of restraint through these difficult financial times we have managed to produce a small surplus in cash terms, (although this is a small deficit after depreciation) for the first time for several years.

On top of this the market value of the investments has risen over the year, not so far as to wipe out the losses we withstood last year, but sufficiently to mean the overall value of our funds was nearly £12,000 higher at the end of the year than at the beginning. As I pointed out last year this is largely a paper exercise, however, and if we were allowed by the Charities Commission to use the more prudent accounting practice of historical cost, rather than market value, we would have seen no great fluctuations in the value of our funds over the last few years. We are stuck with modern accounting practices however, even though they seem to be the root cause of the collapse of western economies.

The Society has been preparing for major expenditure in the coming year. We are about to purchase the underlease of a third room at Dinton Pastures as you have heard elsewhere; we will have to replace our heating and air conditioning system and we expect to be funding the publication of the Society's next book. Just prior to the year end I drew cash from one of our investments so as to be in a position to meet the first of these costs and I would expect we would need to encash more investments later in the year. On the positive side a new air conditioning plant should cut electricity and maintenance costs and we would hope the sale of our new publication would contribute a much needed cash injection.

I have to report that since the year end we have received a most generous donation of £10,000 towards the costs of the new room from the father of the Society, Graham Howarth. This will be of great help to our cash flow but I still advocate restraint in our day to day expenditure. Many of the officers and volunteers who run the Society are very frugal in the way they claim expenses and we benefit greatly from what are really often hidden donations.

John Flynn who has been Assistant Treasurer for several years is taking over from me at this AGM and I thank him for his help and hard work and wish him luck in the future. Roger Hawkins continues to deal with subscriptions, surely the most arduous part of most treasurers' jobs.

I would also wish to thank Alec Harmer and David Young for the work they have done auditing the accounts.

Finally I would like to say how much I have enjoyed my time as Treasurer; I made my first report on the 1990 accounts. Since then not much has changed, John Muggleton was Secretary, Peter Chandler was Curator, we had assets of £284,000 which allowing for inflation is close to the £363,000 we have now. I was concerned about fluctuating investment valuations, at that time caused by the first Gulf war. However for those twenty years the Society has been able to finance the acquisition and running of Dinton Pastures and to provide enhanced and continuing facilities to its membership. We have to remember that we have a duty under the Charities Acts to the membership that exists at any one time and although it is good to look to the future finance of the Society and its stability, our obligation as Trustees is to spend current income for the benefit of current members.

A full set of accounts will be lodged at Dinton Pastures or may be obtained on application to the Treasurer.

Tony Pickles

Statement of Financial Activities for the year ended 31st December 2009

	Un-restricted Funds	Restricted Funds	Endowment Funds	Total Funds 31.12.09	Total Funds 31.12.08
Incoming Resources					
Bequests and donations	–	–	–	–	390
Subscriptions	14119	–	–	14119	14319
Investment Income	4007	3208	846	8061	9254
Trading Income	2264	5639	–	7903	7564
Sundry Income	1088	–	–	1088	1284
Total Incoming Resources	21478	8847	846	31171	32811
Resources Expended					
Direct Charitable Expenditure:					
Cost of Journal & Distribution	9006	–	–	9006	10654
Cost of facility at Dinton Pastures	–	6721	–	6721	3660
Members Meetings & Services	9199	–	–	9199	9162
Library & Curation	2056	–	–	2056	4439
Grants	762	–	–	762	1195
Depreciation	2225	2210	–	4435	4682
	23248	8931	–	32179	33792
Other Expenditure					
Management costs	2292	–	–	2292	2610
Trading costs	329	248	–	577	5464
	2621	248	–	2869	8074
Total Resources Expended	25869	9179	–	35048	41866
Net Resources before transfers	(4391)	(332)	846	(3877)	(9055)
Net Incoming /Outgoing Resources	(4391)	(332)	846	(3877)	(9055)
Gains & Losses on Investment assets					
Realised	–	–	–	–	–
Unrealised	7773	6224	1642	15639	(58505)
Net movement in Funds	3382	5892	2488	11762	(67560)
Fund Balances brought forward at 1st January 2009	75173	257607	18693	351473	419033
Fund Balances carried forward at 31st December 2009	78555	263499	21181	363235	351473

Balance Sheet as at 31st December 2009

	2009	2009	2008	2008
Fixed Assets				
Tangible Assets		137186		141621
Investments		176033		177894
		313219		319515
Current Assets				
Stocks	7980		7370	
Debtors	6326		7019	
Cash at Bank and in hand	38519		23278	
	52825		37667	

Creditors: amounts falling due within one year	2809		5709	
Net current assets		50016		31958
Net assets		363235		351473
Funds				
Endowment Funds – Hering Fund		21181		18693
Restricted Funds				
Housing Fund	194299		190285	
Special Publications Fund	69200	263499	67322	257607
Unrestricted Funds:				
Maitland Emmet BENHS Research Fund	46884		44852	
General Fund	31671	78555	30321	75173
		363235		351473

Tangible fixed assets	*Leasehold Fixtures*	*Property & Equipment*	*Total*
Cost	£	£	£
At 1 January 2009	154736	72444	227180
Additions		–	–
Disposals	–	–	–
At 31 December 2009	154736	72444	227180
Depreciation			
At 1 January 2009	35360	50199	85559
Charge for year	2210	2225	4435
On disposals	–	–	–
At 31 December 2009	37570	52424	89994
Net book values			
At 31 December 2009	117166	20020	137186
At 31 December 2008	119376	22245	141621

Investments	2009		2008	
	M.V.	Cost	M.V.	Cost
Shell T & T	6342	1250	5819	1250
Unilever	8587	248	8101	248
M & G Charifund	67248	20238	61760	20238
Hendersons Bond	54207	58000	47659	58000
Architas Bond	39649	38500	54555	56000
	176033	118236	177894	135736

Unrealised gains arising in the year are shown in the Statement of Financial Activities.

Funds

Analysis of net assets between funds	Tangible Fixed Assets	Invest-ments	Net Current Assets	Total
Endowment Funds:				
Hering Fund	–	21181	–	21181
Restricted Funds:				
Housing Fund	117166	59633	17500	194299
Special Publications	–	60940	8260	69200
Unrestricted Funds:				
Maitland Emmet BENHS Research Fund	–	34279	12605	46884
General Fund	20020	–	11651	31671
	137186	176033	50016	363235

These abbreviated accounts are extracted from the Trustees' Report and accounts, a full copy of which has been lodged at Dinton Pastures and is available to members upon application to the treasurer.

TONY PICKLES

Editor's Report 2009

Volume 22 of the *British Journal of Entomology & Natural History* was published in four parts, for circulation to members in March, June, September and December. The volume length was the second longest in the past ten years, at 276 pages, reflecting the receipt of several longer than average papers. From the records it would appear that there is a slightly increasing trend in volume length over the past decade (c. 10%) and it would be nice to believe that we are now publishing more material in the *Journal* on a regular basis. However the *Journal* is entirely dependent on the enthusiasm and skill of its members who contribute the bulk of the manuscripts and the numbers of submitted papers vary considerably from year to year. I was surprised to discover that we publish about the same or even more field meeting reports than ten or so years ago. A fair number of meetings are held jointly with other societies and this has many benefits, but a frequent outcome is that we often do not receive any reports of these meetings for publication in the *Journal*. A significant proportion of these meetings are held outside the South-East and so it would be very informative to receive reports of these meetings. Our monthly indoor meetings programme ceased about two years ago and as a result there are no reports of indoor Society events and announcements such as the very latest field discoveries. A programme of regional indoor meetings has recently been implemented and it is to be hoped that accounts of these will be published in the *Journal* in due course.

Volume 22 included papers on at least eight Orders of invertebrates, giving it a fairly wide coverage. The most frequently written-about groups were Hemiptera (11), Coleoptera (7), Hymenoptera (7) and Lepidoptera (5). The large number of papers about Hemiptera was a slight surprise but since this group of insects is increasingly recognized as comprising four very distinct lineages: Cicadomorpha (leafhoppers), Fulgoromorpha (planthoppers), Prosorrhyncha (Heteroptera + Coleorrhyncha) and Sternorrhyncha this levels the playing field. Meanwhile the number of papers on Lepidoptera has approximately halved at a time when national recording of this group has been at its most intense and one might have expected an increase in submitted papers. I am still amazed that there appear to have been no reports of any major effects of flooding on insect numbers from those regions most affected in recent years. The *Journal* also included 15 book reviews and six obituaries, including an obituary of Eric Classey, an Honorary member of the Society.

Special thanks go to David Young and Roger Hawkins for preparing the Index to Volume 21 (2008). I would also like to thank those members who have given their time on behalf of the Society; in particular Joe Botting for photographing insects at the annual exhibition and for preparing the colour plates for Part 3, the exhibition recorders, the referees and proof reader Adrian Knowles. Special thanks go to Andrew Halstead for the herculean task of inserting the *Journal* and accompanying flyers into envelopes for dispatch to members four times a year.

Naturally I look forward to receiving more papers in 2010.

John Badmin

Curator's Report 2009

Tony Pickles completed work on the new layout of the Torstenius collection of Scandinavian Lepidoptera, which was necessary due to the donation of further specimens by Stig Torstenius a few years ago. This collection has consequently been expanded to 38 drawers, making necessary reorganisation of the order of the Lepidoptera collections. That was achieved by moving the 20 drawers of caterpillars

to the end of the Lepidoptera block and shuffling the macro moths forward behind the Torstenius collection.

As mentioned last year Ian Sims had kindly volunteered to restage where necessary (due to corroded pins) the remainder of the Emmet collection of Microlepidoptera. He completed this during 2009. He then proceeded to stage the direct-pinned specimens of Tortricidae and Pyralidae in the original Society's collection, which he has also completed. This only left the Messenger collection with unstaged specimens of the two latter families in a 12 drawer cabinet. Ian has begun work on this, which together with his previous work, will assist with completion of the layout of the Society's Microlepidoptera in a single collection. No further progress has been made with this as yet, so as reported last year it is complete to the end of the Scythrididae. I thank Ian for the work he has so far completed.

The 40 drawer cabinet that had housed Colonel Emmet's Microlepidoptera collection was vacated as a result of Ian's efforts and this was offered for sale to members. Bids were invited and it was proposed that the identity of the highest bidder would be revealed at the 2010 AGM.

As mentioned in previous years there are still a large number of unnamed micro-moths, mostly in store boxes and identified to family level, and any further assistance with these by specialists would be appreciated.

In the absence of volunteers to carry out the much larger task of repinning and labelling the Coleoptera and Hemiptera collections as set out in last year's report, consideration continued to be given to sources of funding for this project. This will be investigated further during 2010 and priority in this respect will be given to the Coleoptera.

I reported last year that our former member and assistant curator Bill Parker had died on 4 January 2009 and that we had received the surviving specimens from his collection, as well as his Lepidoptera records and photographic slides. The approximately 3000 beetles retrieved from his collection had originated from the Society's duplicates and include material from several collectors including F.D. Buck and T. R. Eagles. These specimens are now in one storebox and four small drawers and, although apparently unnamed, are labelled with the relevant species numbers from Hudson-Beare's list of British Coleoptera.

Several members have again donated valuable material to fill gaps in the collection and I am grateful to them for their continuing interest in building the collections.

PETER CHANDLER

LIBRARIAN'S REPORT 2009

During 2009 your library has received two large donations of books and journals from Paul Harding and Bernard Verdcourt. Paul's generous donation included much material on cave fauna, a subject we were greatly deficient in, while Bernard's included many RES keys to the Identification of British Insects that are now out of print, as well as many of the more recent publications in this series. On your behalf I would like to extend our appreciation to these gentlemen for their extremely generous gifts which I am sure members will make good use of over the coming years. In the same vein, I wish also to thank Jim O'Connor, Peter Chandler, Julia Locke, Ian McLean, David Baldock, Peter Dyte and the Amateur Entomologist's Society for donations of books and journals during the year.

The quantity of items donated to the library, and my volunteering to re-stage the microlepidoptera collections of Emmet, Messenger and part of our general micro

collection, resulted in my asking Council to appoint an Assistant Librarian to help with data entry to our digital data base. Martin Albertini volunteered his services for this role, and I am pleased to say that his assistance in this matter has been greatly appreciated. Assistance has also been forthcoming over the year from John Muggleton, who helped with the rationalisation of our collection of separates, and from Peter Chandler who catalogued the manuscript field books and diaries that have been bequeathed, or otherwise donated, to your library over several decades.

Due to my routine library commitments and micro re-staging work I was unable to commence the project to restore damaged books and journals, referred to in last year's report. No doubt, with the current financial climate, our Treasurer will not mind this. However, if finances permit I intend to progress this project during 2010.

Finally, I am pleased to report that a series of late loans recall letters I sent to members with outstanding loans, some over three or four years overdue, resulted in the return of 15 books I feared had been lost.

Ian Sims

Dipterists Forum Report 2009

The year started with two very interesting workshops in Preston Montford from 6–8th March. The hoverfly course was led by Stuart Ball and Roger Morris, while the course for advanced dipterists on picture-wing flies was led by Alan Stubbs and Martin Drake. The hoverfly course participants commented very positively on their course and some joined Dipterists Forum or were already members. Alan had produced some useful keys and diagrams to help identifying specimens to these families as well providing updated keys to the species of Tephritidae, Ulidiidae, Platystomatidae and Pallopteridae. He also gave us some helpful tips on habitats and finding larvae. Martin Drake gave us an informative short presentation on the Opomyzidae before we tested the keys that he had provided. He also provided some tips on how to quickly spot the more unusual species when sampling grassland, where they can occur in large numbers. Richard Underwood had brought part of the collection from Liverpool Museum. The chance to see a good range of species, compare similar ones and note areas of the keys that cause you problems is one of the great strengths of these workshops. It was also very helpful to see so many photos and drawings of the different species and get the differences explained before trying to tackle these species. The social gatherings in the evenings and during the breaks were as usual very enjoyable.

The Spring Field meeting from 30–31st May was in Scarborough and the North York Moors. It was very successful and, unusually for 2009, the weather was hot and sunny, as in the year before. Fourteen people participated and they enjoyed this meeting very much. Although it was too early for *Odontomyia hydroleon*, they saw the only stronghold of this BAP species in the UK.

The Summer Field meeting in Swansea from 4–11th July had a much higher number of participants (31) which included, beside many dipterists, some coleopterists and hymenopterists. It was very well organised and despite the challenging weather, we did pretty well and as usual a good range of interesting flies was found. Most participants stayed in student accommodation at Swansea University. This venue was ideal for the South Wales sand dune system and Roger had managed again to get us access to wonderful sites. These included Whiteford Burrows, Crymlyn Burrows, Rossily Bay, Kenfig and Merthyr Mawr. Other habitats of the Gower Peninsular include wet moorland with *Molinia* tussocks, steep sided

woodlands, seepages and flushes on hillsides and, of course, wetlands including some wonderful wet valleys close to the coast. Unfortunately, most of us chose sites that would dry out quickly, as the weather was rather mixed.

Roger arranged two Autumn Field meetings; the first from 12–19th September to the Scottish Borders was attended by only six people which is, even for the autumn meeting, a very low number. However, judging by the photos in Bulletin 69 and the comments received, everybody enjoyed it and they had a good time. They managed to record more than 100 species of fungus gnats, which is a rather large number. The second meeting was in Bridgnorth from 10–14th October and had more dipterists attending, nine in total, but they did not manage to repeat the good fungus gnat results from Scotland. Nevertheless, even the somewhat mixed weather did not dampen their mood and they had an enjoyable meeting.

The Dipterists' Day and AGM at the National History Museum, London, 28th/29th November was well attended, with 57 members. Erica McAlister, who also gave the introduction to the day, Hannah Cornish, who explained the new Angela Marmont Centre for UK Biodiversity, and Kim Goodger had organised this meeting very well. During the day we had four talks of a very high standard. Chris Thompson, Smithsonian Institution, Washington D.C., gave a talk titled 'Dipterology, Yesterday, Today and Tomorrow'. His very informative and enjoyable talk gave a wonderful overview over the past of dipterology starting with Aristotle, over Linnaeus and Fabricius and ending with present advances. The next talk was by Geoff Hancock, Hunterian Museum, University of Glasgow, and had the title 'Thoracic spiracular gill structure of pupae of the genus *Lipsothrix* (Diptera, Limoniidae)'. What sounded like a highly technical, probably even boring talk, turned out to be very entertaining and informative. The next talk by Graham Rotheray, National Museums of Scotland, on 'Functional Morphology of Higher Diptera' was equally fascinating. The last talk was by Stuart Ball and Roger Morris on their recent work on hoverflies. After showing the more than 600,000 records for this group on a map, Stuart showed various statistical methods to analyse this data, but pointed out that one has to be careful with the interpretation as good recording is essential before basing any conclusions on the data. After the AGM in the afternoon, a short session on Recording Schemes followed where Peter Chandler gave a very good presentation on the Fungus Gnat Recording Scheme including showing recent advances towards putting all his data onto the NBN. Darwyn Sumner gave an excellent presentation on the stilt and stalk flies and John Kramer on the Cranefly Recording Scheme. The day ended with a well organised meal at a local Thai restaurant. The next day was spent in the collections and it was good to see the new facilities and that the museum welcomes visitors again after the huge move into new premises.

Two excellent *Bulletins* and *Dipterists Digests* were published with a lot of interesting information. Copies of these can be found in the library in Dinton Pastures. The *Bulletin* has changed its printers and looks much more like a popular journal now.

The membership has increased by 23 new members to a total of 353 members thanks to the efforts of Mick Parker (Membership Secretary), Judy Webb (Publicity Officer) and many other committee members.

BARBARA ISMAY

British Myriapod & Isopod Group (BMIG) Report 2009

Apart from BMIG's usual annual cycle, described below, there were two important publications in 2009. CEH/BRC published *Woodlice and Waterlice in Britain and Ireland*, by Steve Gregory – a completely new "atlas" with detailed ecological text and many colour photographs of species. The *Linnean Society Synopsis No. 58, Centipedes*, by Tony Barber, followed close on the heels of his *AIDGAP key to British Centipedes* published in 2008.

Tony Barber is busy collating data for his forthcoming Centipede "atlas", but found time to organize a very successful annual field meeting and AGM at Ladock, Cornwall in April. Several members also joined Des Kime and continental colleagues for a second survey trip to northern Spain in April. Paul Lee edited the spring and autumn newsletters, keeping members informed of news, and publicising events. The newsletter goes out to some 250 members, many of whom are overseas. Material for Volume 24 of the *Bulletin of the British Myriapod & Isopod Group* has been held over for publication as a larger issue in Spring 2010.

The committee held its autumn meeting near Cambridge, for the first time over two days. This enabled us to take time to plan, and to make a number of important decisions. These included the future of our website *www.bmig.org.uk* (managed by Glyn Collis) and the *Bulletin* (editors Helen Read, Tony Barber and Steve Gregory), habitat recording and priorities for "post-atlas" recording.

Paul Harding

PRESIDENTIAL ADDRESS
PART I: REPORT

Brian Elliott

18 Bellflower Way, Chandler's Ford, Eastleigh, Hampshire SO53 5ND

I would suspect that most Presidents first of all look at previous Presidential addresses not only for interest, but to see if there is a common thread to unite us all as the years go by. Indeed, each of us has a statement to make one way or another and I will be no exception, though my opinions are personal and may not represent the views of the Council. To go back, the invitation to become President came like a bolt out of the blue and my cautious acceptance was the airy reassurance that I just had to turn up for eight or so Council meetings, open the Annual Exhibition, stand up at the Annual Dinner, give an address at the AGM and find another President! Not so! But I must say, I have no regrets.

I had no experience of the workings of the Council, but my acceptance was coloured by the fact that I would have the presence of our long serving Secretary, John Muggleton, to guide me and this has proved to be the case. I was asked if I was interested in serving for two years and I could well appreciate the thinking behind this, but one year is enough for me as a figurehead. The thought of finding another subject for, and working on, yet another Presidential address Part 2 was discouragement enough.

Well, what have I done, in my year? Well frankly, not a lot. I have been carried along by all the Officers of the Society in the most seamless fashion possible. John Muggleton has always been at my elbow at Council meetings and prompted me where I have needed it. Martin Albertini, the Building Manager, is on top of his job reporting and dealing with any problems at the Pelham-Clinton Building at Dinton Pastures along with Peter Chandler, our Curator and Ian Sims, our Librarian.

I must give special mention to David Young who seems to effortlessly turn his hand to such diverse activities as Membership Secretary and Christmas card sales, and has given good advice to me when I have asked, and on odd occasions, when I haven't! John Badmin our Editor must spend forever dealing with the complexities of publishing. Being a two finger typist, I often think of the effort that goes into his publishing operations.

Andrew Halstead, Roger Hawkins and Ian McLean have all been very helpful, especially Roger who has attended all the outlying members' days organised by Ian. I also must thank Gavin Boyd for his meticulous accounting as Sales Secretary and wish him well now that he is retiring and moving back to his roots. Tony Pickles has been navigating us carefully through the recession and particularly with the ongoing negotiations with Wokingham Council which have been referred to elsewhere. John Phillips I must say has steered me through the complexities of Invertebrate Link and conservation matters which relieves all of us on Council of quite a burden of interpreting it.

Thanks to Mike Simmons, the Annual Exhibition and Dinner ran smoothly. I have endeavoured to support Dr Paul Waring, our Field Meetings Secretary, and this is something which I intend doing in the future and I would urge more members to do so. The appearance of our website has improved greatly during the year and this is due to our website manager, Tony Prichard, who has been hard at work on it.

There are of course, twenty members of Council and apologies for absence are in a minority which is an indication of the dedication of our Council members. There are also two female Council members now, which is a sign of the times and female representation will no doubt increase as the years go by. I did note a significant female presence at the AES Exhibition last year at Kempton Park and a similar trend at our Exhibition.

Now as President, what have I got out of it? Well, I now have a better appreciation of the varied interests of Society members. I have got to know a lot of people who were previously just names to me over the years and made some new friends. This is partly because most of my time as a member has been distant from the centres of Society activity. Now that we are actively devolving meetings, I have had the opportunity to meet people from other parts of the country and I have found that regional meetings do satisfy a real need. The first regional meeting that I attended was truly local for me, being at Hampshire County Council Museums Service where I received a taste of what these meetings offered both in variety of content and standard of presentation. The second one, on my old stamping grounds, and which I chaired was at Clifton Park Museum, Rotherham where, again, there was an interesting and varied agenda. On this occasion I was supported by Ian McLean and Roger Hawkins. My final effort, was at Bristol City Museum and Art Gallery which was very well attended as were the others.

Our constitution provides for the appointment of up to twelve Honorary Members and soon after I became President, there were five vacancies. After some prompting from a senior member I took the decision to fill them from long standing members of the Council as a reward for the effort they put into it. These new Honorary Members are Gavin Boyd, Andrew Halstead, Ian McLean, John Muggleton and David Young. I would have liked to have appointed several more if the constitution would have allowed it. That will have to be left to a future President now.

Now I must pose the question: "What didn't I get out of it?" Well I would have liked to have been President when our new constitution is put to Council, and then the membership, for consideration, particularly our aims. I also toyed with the idea of exploring means of abbreviating our name to make it more user friendly

and abandoning the Natural History Society bit, but without offending our arachnological and other minority members.

Now, there is an old Chinese curse that says that we always live in interesting times. My entry into the world of entomology was coloured by Dr E. B. Ford's *Butterflies* published in 1945, which I came across in 1951 and made full use of in my GCE studies. Then came his book *Moths* in 1955 and again, use of it gave me my insight into genetics. Evolution was now proven to my satisfaction, not only in nature but, as I now realise, in life in general. Things have not stayed stationary. I was experiencing a personal evolution in my journey through life and it was a bit of a shock having been farm born and seeing my countryside birthplace, and former shaper of my entomological interest, engulfed in a sea of housing. I have witnessed the drive to monoculture over these last fifty years in farming and forestry and though there are now many attempts to mitigate this, the end result, I fear, is going to be disaster for this country. You see there is an elephant running amok. It is called overpopulation and no current political party with a chance of power has either the guts or the ability to address it.

Sir Andrew Green of Migration Watch and the Office of National Statistics advise that we are looking at a population growth to a total of 70 million within the next twenty years and the outlook for any sustainable and varied wildlife is in my opinion bleak indeed. This equates to five cities the size of Birmingham, let alone the infrastructure and services to support it. A taste of things to come was Buglife's struggle over Thurrock Marshes. Locally where I live, we now have a titanic planning application submitted by Associated British Ports which will engulf the west side of Southampton Water. And so on. Anyone who is as alarmed as me should make their feelings known to any politician they come across.

Now one duty which no President likes to report on is the passing of members of the Society. There have been nine deaths during my term of office.

Reg Bell (R. A. Bell) died in August 2009. He was aged only fifty nine years, but had been in poor health for a long period, which was not helped by the demise of his wife, Suzy, who as his helper was well known in entomological circles. His forté was the breeding of macrolepidoptera and in this he was highly successful. He had been a member since 1980, but his developing disabilities precluded him from attending Society functions in recent years.

Dr Clifford Edwards, of Oban, Argyll died on 25th September 2009, aged 95 years. He had been a member since 1970. His collection of books was bequeathed to Glasgow University Library and his insect collection was donated to the Glasgow Natural History Society.

Graham Griffiths, died in May 2009, having been a member since 1953. He was based at Athabasca University, Alberta and had devoted a lifetime of study to Diptera, specialising in Nearctic Anthomyiidae and, at the time of his death, was still engaged in a monumental revision of them over the past 30 years describing a total of 170 new Nearctic species and writing a total of 15 parts of the *Flies of the Nearctic Region* (some 2635 pages.).

The Rev. Anthony Harbottle died on the 2nd December 2009. Anthony had a very long and active life going back to the days of F. W. Frohawk whose funeral he presided over in 1946 and of whose daughter, Valezina, he remained a lifelong friend. He was part of the old school of entomologists and amassed a large collection of Lepidoptera, especially forms of *Colias croceus*, the Clouded Yellow. His enthusiasm was passed onto his children, two of whom I believe have been members of our Society at some time. His membership went back to 1948, before which time he served in the Royal Marines during WW2. He later became the Queen's Chaplain at

Windsor Great Park, holding that office from 1968 to 1981. He retired in 1996. At some time he was involved, along with Miriam Rothschild, with the introduction of the Marbled White to Prince Charles' home at Highgrove.

Charles MacKechnie-Jarvis. It is very sad to report the death of our oldest member who died on 22nd March at the age of 101. He joined the Society in 1925 and thus completed 50 years continuous membership in 1976 (not many years after I joined the Society!). He was President in 1974, and was a coleopterist and a very active member in his time. On reaching his 100th Birthday the Society conferred upon him Honorary Membership, which he was delighted to receive.

Michael Shaffer died in March 2009, another member with a long and distinguished record. He joined our ranks in 1961. He gave long and dedicated service to the Natural History Museum where he was responsible for the curation of the Pyralidae which was done to a standard that was legendary. His knowledge on the subject was unrivalled and no papers about the Pyraloidea were published in the last few decades without acknowledging his input. He also turned his attention to the Lepidoptera of the Channel Islands and privately published an extraordinary 710 page book on the subject, recording, in the minutest details, anything that had ever been published on the subject.

Peter Skidmore died in July 2009. He had been a member since 1996. He was well known amongst coleopterists and dipterists in the Society and had been ill for some time. It was fortunate that he was able to complete an important paper, 'The Diptera of the Western Isles', which was published in the *Dipterists Digest* earlier this year.

Geoffrey Burton died on the 14th February 2010. He had been a member since 1977 and had been very active in the Kent area. He was at one time on the Council and served as an Assistant Treasurer from 1985–1994. He ran a Rothamsted trap on Sheppey for many years and contributed valuable data to the Scheme.

Ian Rutherford died last year. I knew him from my days in the north of England when we first met as long ago as 1963 when we both went to shake the same sallow bush. He had been a very active lepidopterist in the north west midlands and joined the society in 1962. Regrettably, I only found out about his demise recently. He was 89 years old at the time of his death.

I now invite you to stand for a minute in their memory.

Thank you ladies and gentlemen.

BOOK REVIEW

Colour Identification Guide to Moths of the British Isles (Macrolepidoptera), 3rd revised and updated edition by Bernard Skinner. Illustrated by David Wilson. Apollo Books, Denmark, 2009. 325pp., 51 colour plates. Hardback, ISBN 978-87-88757-90-3. Price £48.00.

This is the most comprehensive publication on the UK macromoth fauna published to date. Since the second edition, published by Viking in 1998, an additional 48 species of macros have been included in the illustrations (plates 44 and 45), of which 35 are new additions to the British fauna. Plate 45 also includes four species of microlepidoptera which could be confused with certain macro taxa.

Although plates 1 to 43 show the same photographs as those published previously, the present plates are superior in quality having been re-scanned from the original photographs. Comparison of the new plates with those from the previous editions shows that often greater detail of wing markings is now apparent. For example, compare the various editions' illustrations of the burnets on plate 2, the Phoenix

(*Eulithis prunata*) on plate 8 and the Green Arches (*Anaplectoides prasina*) on plate 28, though there are numerous other examples. In addition to these 45 plates, there are six supplementary plates consisting of photographs of the right-hand fore and hind wings of critical species shown at $\times 2$ magnification. These include the foresters, some carpets, waves, wainscots, caradrinid rustics, straws, plusias and fan-foots, among others. In total, 155 species are so illustrated.

But it is not just the illustrations that have been "re-worked". The text has been expanded to encompass the additional 35 new species added to the British list since the second edition was published in 1998, and many of the pre-existing entries now include notes on distribution and recent records, updated to 2008 where appropriate. For example, see the text relating to the Gypsy Moth (*Lymantria dispar*), Great Brocade (*Eurois occulta*), Red-headed Chestnut (*Conistra erythrocephala*) and the various Bordered Straws (*Heliothis* spp.).

There are several unfortunate editorial glitches, but these have been extensively covered in reviews elsewhere so I do not propose to dwell on them here. Suffice to say that the publishers, Apollo Books, provide a comprehensive corrigendum in the form of self-adhesive text that can be affixed over the problematic text.

All-in-all, this is a worthy publication which all serious lepidopterists in the UK, and Europe for that matter, should have ready access to.

IAN SIMS

When the first edition of Bernard Skinner's *Colour Identification Guide to Moths of the British Isles* was published, it revolutionised the study of macro moths in the UK. For the first time, images of all of the British macro moths were available in one book, with up to date distribution information. The interest generated by this book caused a whole new generation of moth recorders to be created. Indeed, such was the interest that by the mid 1990s, so much new information had been generated and several species added to the British list, that a revised edition was produced, with an extra plate covering these new species.

In the ten years since the last edition, new books have come onto the scene, filling a niche, and moving away from the tradition of displaying set specimens. Thus another new generation of moth recorders has been created, and 'natural resting postures' seemed to be what the public wanted. Why then is there the need for another revision of Bernard's masterpiece?

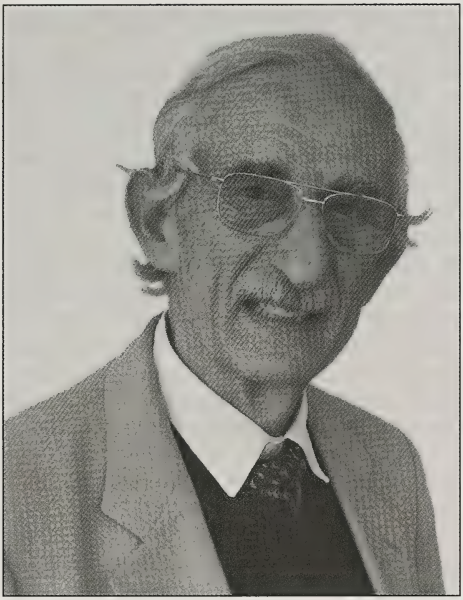
The advances in knowledge, yet more new species alone make it worthwhile, but there are several other things that set this edition above its predecessors. For one, the plates have been re-mastered, and the colour reproduction is incredible compared to the previous editions. There are new plates for the new species as well as some that were never figured in the original. More importantly, there are some new comparison plates with greater magnified images to help separate some of the easily confused species (although watch out for the typo that puts the two *Perizoma* species the wrong way round).

And as for the use of the set specimens rather than 'resting posture'? I personally find it much easier to work with images of set specimens. Resting postures only work if the moth knows how it is meant to sit, and all too often they don't! For me the consistency of set specimens is by far the best way to see the subtle differences between two species.

So in spite of the competition from the other books on the market, I firmly believe that this is the new standard work for people who are serious about studying macro moths in Britain. A 'must have'.

DAVID SLADE

OBITUARY



Michael Shaffer, 1936–2009

Michael Shaffer, who died unexpectedly in his sleep on 23 March 2009, was born on 6 July 1936 in Hackney, London. He was educated locally and left school in 1951 at the age of 15 to begin his career in biology as a preparator in the microscopy department of Gerrard's of London, the biological suppliers. So keen was Michael on this job that on his first day he found himself before closed doors, having overlooked that it was a Bank Holiday. In 1952 he took a post as a technician at University College London under Britain's leading immunologist, the later Nobel Laureate Professor Sir Peter Medawar. Michael immensely enjoyed the time in this stimulating environment. When Sir Peter wrote a testimony for Michael in support of a job application, Michael so treasured it that he never submitted it for its intended purpose – he kept it all his life.

Whilst at University College London, Michael was called up for national service and saw an adventurous time in the Royal Army Medical Corps, where he was engaged in pest control and hygiene issues of the British Army of the Rhine in Germany, warring against cockroaches and rats in Hamelin (Hameln).

Michael found his true vocation when in 1958, soon after his return from national service, he followed Reg Harris, another mentor at University College London whom he greatly admired, to the then British Museum (Natural History), the institution to which he would dedicate the next 50 years of his life. He entered the Entomology Department where, after an initial training period in the setting room, he joined the Lepidoptera Section as an assistant to Dr Paul Whalley, who was responsible for the Pyraloidea, Thyridoidea and the plume moths. His immediate colleagues included many members of the British Entomological & Natural History Society, then still the South London, such as John Bradley, Gerry Tremewan, David

Carter and Arthur Smith. The last was an idiosyncratic but gifted departmental illustrator who took an interest in Michael and helped him develop his artistic skills. Michael assisted Paul Whalley in making genitalia slides, producing superb line drawings for Paul's publications and making up the plates for reproduction. But above all Michael saw to it that, whenever Paul had completed a research paper, the collection was put into superb order, the types properly labelled, all specimens identified, labels straightened and the relevant drawers neatly laid out in the new order, whilst all taxonomic novelties were carefully recorded in the accompanying card index which Michael kept up-to-date even beyond the time when it had been scanned and put on the internet as part of LepIndex (http://www.nhm.ac.uk/research-curation/research/projects/lepindex/).

The Museum's collections of natural history objects are the most comprehensive inventory of life on earth and summarize our current knowledge whilst holding the answers to questions not yet formulated. The quality and quantity of retrievable information is directly related to the quality of a collection's arrangement: how well it reflects the natural order of things, the true relationships between species. To arrange the collections in a manner that maximises their information value is the work of the specialist curators – and Michael was one of the very best amongst them. With his profound sense of order coupled with great attention to detail and a keen eye for subtle differences between species he was uniquely suited to this job. He had perseverance and the patience to apply himself for long hours to even the most tedious tasks if needed. And he had – above all – a never failing memory for all matters concerning pyraloid moths.

Michael was not a university-trained research scientist but he learned his trade first and foremost on the job, and he learned it in the exceptional setting of the BMNH and from the best craftsmen in their field. He was responsible for about 35,000 species of pyraloid, thyridoid and pterophoroid moths represented by hundreds of thousands of specimens. He had succeeded to the best pyraloid collection in the world from the great Sir George Hampson and, not least because of that unrivalled collection, he met a constant stream of leading international experts. By assisting and working alongside the great pyraloid specialists of his day, foremost amongst them Eugene Munroe of Canada, Michael absorbed their knowledge and almost imperceptibly turned into one of their number. It is impossible to say when exactly Michael had transmuted from the eager apprentice to the master of his craft whose knowledge and expertise was widely sought and valued. But it was a visible sign that Michael had reached the top league when in 1980 he co-authored with Munroe a thorough 120-page taxonomic revision of the large south-east Asian genus *Vitessa*. And although Munroe figured on the title in the senior position it was, in fact, Michael who had been the principal author. Over decades no significant taxonomic paper on Pyralidae was published anywhere without acknowledging Michael's help and advice. His knowledge of the world pyraloid fauna was so unique that he received invitations to work on the most important international collections including the Australian National Collection in Canberra, the Canadian National Collection in Ottawa and the US National Museum in Washington. Michael has greatly influenced a whole generation of younger pyraloid specialists who held him in such esteem that they dedicated to him an entire number of *Entomologica Scandinavica* (**28**(4): 361–551, 1997) as a *Festschrift* to mark his official retirement from the museum in 1996. This esteem was equally expressed in the numerous messages of condolence his wife and colleagues have received from around the world. As a young American PhD student put it 'He was really one of the giants on whose shoulders I stand'.

Michael was deeply committed to the BMNH but his dedication to the pyraloid moth collection, large parts of which he himself had curated to the very highest standard, was legendary and extended beyond his retirement until his death. He saw it as *his* collection, which he jealously guarded and vigorously defended against anything he considered improper use. A generation of pyraloid workers, young or old, will never forget how Michael hovered over them, visibly reluctant to let them even lift a drawer lid. Michael's passing away leaves a huge gap in the collective knowledge of the BMNH lepidopterists but he left us a great legacy in his collection.

In 1958 Muriel Park, at that time leader of the *Young Explorers Club*, took the young Michael along on one of the club's outings to Alderney. That was the beginning of his life-long love affair with the Channel Islands and spawned the idea of writing a book on their Lepidoptera. Michael never lost sight of this aim and after his retirement intensified his visits to the islands, enthusiastically assisted by his wife Monika. His efforts finally resulted in 2008 in an extraordinary, privately published 710-page book entitled *Channel Island Lepidoptera* in which he recorded painstakingly and in the minutest detail everything ever published on that subject.

Michael's interest in overseas travel was greatly stimulated in 1995 when he joined his botanist wife, Dr Monika Shaffer-Fehre, on a trip to Sri Lanka to collect ferns for the Royal Botanic Gardens, Kew. This was soon followed by several private trips to Australia, New Zealand and the USA, usually combining some museum work with general nature studies and especially bird watching.

Michael's interests outside the Pyralidae were many and varied: he enjoyed bird watching and classical music, collected postage stamps and mammal photographs and was highly knowledgeable on the history of the American West. In fact, it was a highlight when he visited the American *National Rifle Association* and was allowed to handle some of the historic guns in their collection. As a keen sportsman he played tennis, did fencing and was a stalwart of the museum's cricket team. With the team long defunct Michael still wore the club tie, appropriately depicting a cricket, almost to the end of his life.

With the decease of Michael Shaffer the Society lost one of its longest-serving members. Michael had joined the South London Entomological & Natural History Society, now the BENHS, in 1961 and for many years held office as its lanternist. Although in recent years he rarely attended the society's meetings, he never failed to visit the annual exhibitions to look out for interesting pyrals and plumes. He will be remembered for his utterly extraordinary encyclopaedic knowledge of the "Pys" (as he fondly called them) and his indefatigable willingness to identify specimens that had confounded lesser mortals.

KLAUS SATTLER

FIELD MEETINGS

Hogmoor Inclosure, Whitehill, Bordon, Hampshire, 6 June 2009

Leader: **Stephen Miles.** – Permission was obtained from the Ministry of Defence for the use of generators and light-traps. The trap site chosen was 300m east of the Inclosure's western edge, within a small area of open heather, in the same general area used for a similar moth-trapping evening in 2008.

The habitats present on this site are heathland with deciduous and coniferous woodland and scrub; it is also a local Site of Interest to Nature Conservation (SINC). It is currently an Army tracked-vehicle training site threatened by building development encroachment promoted by the local East Hants District Council and the UK Government. The meeting was organised as a joint meeting of the Alton Natural History Society (ANHS) and the British Entomological and Natural History Society (BENHS) with the purpose of recording moths and general natural history observation to provide more site information for the Local Biodiversity Action Plan. Fortunately it was dry for the evening but overcast with a temperature of about 16°C, the forecast rain only commenced at 12.30am after everyone had packed up and left the site.

Three members of the ANHS including the leader turned up, plus two other local moth enthusiasts, the leader being the only representative of the British Entomological & Natural History Society. Pat Ridley recorded a specimen of the plant, cranberry to the north-east of the trap site. As the light faded a pipistrelle bat was seen and a song thrush was heard before trapping began in earnest. No nightjars were heard during the whole meeting – this was probably due to the heavy daily disturbance the site receives from military vehicles and people and their dogs.

Two mv lights were run by Bill Wain and Nick Montigriffo, one in a shaded position under mature pines surrounded by bracken, the other in open, previously burnt heathland. Actinic light traps were also run individually by David Hamilton and Stephen Miles. All of the traps were run for approximately 3.0 hours, the trapping period ending at about midnight. Moths were fairly slow in coming to the traps; so that the night's total was only 38 species, a slight improvement on the 36 species recorded here in mid-May 2008. The Common Marbled Carpet, *Chloroclysta truncata* (Hufn.), the Grey Pine Carpet, *Thera obeliscata* (Hübn.), Tawny-barred Angle, *Macaria liturata* (Clerck), Bordered White, *Bupalus piniaria* (L.) and Straw Dot, *Rivula sericealis* (Scopoli) were all in double numbers. Also there were at least 85 specimens of the micro-moth, *Scoparia ambigualis* (Treitschke).

Two of the species were nationally notable (Nb); these were two specimens of the Satin Lutestring, *Tetheella fluctuosa* (Hübn.) that in the larval stage feeds on birch. The second was a single specimen of the Rosy Marbled, *Elaphria venustula* (Hübn.) which in the larval stage feeds on tormentil, both of these species have occurred previously in this tetrad – SU7834. Four macro-moths and eight micro-moths were new to this tetrad based on the published records up to 2001 included in the "Moths of Hampshire and the Isle of Wight" by B. Goater and T. Norriss. No BAP or RDB species were found.

The more local of the species in the traps in terms of their previous tetrad and 10km square occurrence in north and east Hampshire (for reference see the distribution maps at *www.hantsmoths.org.uk*), east of the vertical easting grid line labelled by the figure 60 were: the Gold Swift, *Hepialus hecta* (L.) with post-2000 records from twelve tetrads in four 10 km squares; *Pyla fusca* (Haworth), with post-2000 records from two tetrads in two 10 km squares; *Dioryctria simplicella*

Heinemann, with post-2000 records from 12 tetrads in eight 10 km squares; *T. fluctuosa,* with post-2000 records from ten tetrads in four 10 km squares; and *E. venustula,* with post-2000 records from twelve tetrads in seven 10 km squares. Most of the moth recorders were pleased with the night's catch, as they were able to take photographs of those specimens that they had not seen previously.

The leader thanks the Chairman of the Longmoor Conservation Group, representing Defence Estates for permission to hold this meeting.

Warburg BBOWT nature reserve, Bix Bottom, Henley, Oxfordshire, 27 June 2009

Leader: **Paul Waring**. – Early in 2009 the leader was asked by Kelly Thomas, the newly appointed Biodiversity Co-ordinator for the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT), if he would consider conducting a moth-trapping meeting at the Warburg nature reserve, Bix Bottom, for the children in the local Watch Group. When Kelly sent accompanying details about the reserve, the leader realised she had no idea he had first operated light-traps on this site thirty years previously, had visited subsequently and had in fact known the site since the early 1970s when he made several visits with his family and also one on a trip from Magdalen College School. The school trip, in about 1974, was particularly memorable in that the leader captured a large grass snake *Natrix natrix* in his bare hands, to show to his class-mates. While enduring this handling, the snake evacuated a foul-smelling mess from its cloaca over one of the hands holding it, and this was still stinking pungently on the school-bus journey home, several hours later! The snake had been released on site, otherwise unharmed.

In writing up the results of this 2009 field excursion, which the leader decided to make a combined BENHS field meeting and Watch Group event, he takes this opportunity to celebrate his thirtieth anniversary of light-trapping on the Warburg reserve and to draw together a summary of his previous sessions. These results are previously unpublished, though they were at least supplied to the offices of BBOWT and the Oxfordshire Biological Records Centre at the time, and the data have been incorporated into the master-list for the reserve and its supplement (Phillips *et al.,* 1988, D'Ayala, 1995).

The site that is now the Warburg reserve was bought by BBOWT in November 1967. It comprises 254 acres of land, mostly woodland and scrub in a valley system on chalk, with some remnants of chalk grassland which have been restored through management. The reserve has an extremely diverse flora, a substantial moth list, and is a SSSI. The leader's earliest visits were all by day and although some butterflies were recorded, the opportunity to stay overnight to operate light-traps for moths did not come until 1979. By this time the leader had been operating a Robinson light-trap in his garden since 1975, and occasionally elsewhere, using a borrowed generator, and transport from older friends with both cars and driving licences! Three light-trapping visits were made in 1979, with Ron Louch providing the transport on these occasions. These were not the first moth recording events on the reserve however. There was already a fairly extensive list of macro-moths for the site as a result of recording, primarily by Brian Baker, Berkshire County Moth Recorder at the time, supplemented with visits from others. The visits by the leader in 1979 took place on July 1, July 14 and August 4. The weather on all three nights was favourable. All three nights were still and dry, with variable amounts of cloud. The air temperatures at dusk ranged from 13–18°C, and the minimums from 7–14°C. On all three nights a standard-pattern Robinson trap with a 125W MB/U bulb and plastic and wire rain-shield was operated in the car park below the reserve reception

centre and office and a portable 6W actinic light-trap was placed on top of a bank some 30 m from the office. The traps were operated from dusk until about 07.00 h next morning. A total of 133 species of macro-moths was recorded in all (Waring, 1979). The more noteworthy species were the Leopard Moth *Zeuzera pyrina* (L.)*, Common Lutestring *Ochropacha duplaris* (L.)*, Blotched Emerald *Comibaena bajularia* (D. & S.)*, Birch Mocha *Cyclophora albipunctata* (Hufn.), Chalk Carpet *Scotopteryx bipunctaria* (D. & S.), Barred Yellow *Cidaria fulvata* (Forst.)*, Dark Umber *Philereme transversata* (Hufn.)*, Small White Wave *Asthena albulata* (Hufn.), Scorched Carpet *Ligdia adustata* (D. & S.), V-looper Moth *Itame wauaria* (L.), Lunar Thorn *Selenia lunularia* (Hbn.), Privet Hawk-moth *Sphinx ligustri* (L.)*, Lobster moth *Stauropus fagi* (L.)*, Dotted Rustic *Rhyacia simulans* (Hufn.), True Lover's Knot *Lycophotia porphyrea* (D. & S.), Purple Clay *Diarsia brunnea* (D. & S.)*, Dotted Clay *Xestia baja* (D. & S.), Square-spotted Clay *Xestia rhomboidea* (Esp.), Green Arches *Anaplectoides prasina* (D. & S.)*, Minor Shoulder-knot *Brachylomia viminalis* (Fabr.), The Miller *Acronicta leporina**, Reddish Light Arches *Apamea sublustris* (Esp.)*, Clouded Brindle *Apamea epomidion* (Haw.)*, Large Nutmeg *Apamea anceps* (D. & S.)*, and Beautiful Hook-tip *Laspeyria flexula* (D. & S.)*. The species marked * were recorded again by the leader in the 2009 event (see later).

Two additional light-trapping visits were made by the leader, in 1984, essentially to compare the results of three 6W actinic Heath traps operated in open grassland on the former rifle range, with three identical traps operated in adjacent birch woodland, supplemented by a Robinson trap operated in the visitor car park for general recording purposes. The first visit in 1984, with Tony Strong, took place on April 22 and resulted in a list of 28 species of macro-moths including the Early Tooth-striped *Trichopteryx carpinata* (Bork.) (particularly numerous, catches of 14 and 15 individuals in two of the actinic traps, in a hedged lane and amongst thinned birches, but only 7 in the Robinson trap), Water Carpet *Lampropteryx suffumata* (D. & S.), Streamer *Anticlea derivata* (D. & S.), Frosted Green *Polyploca ridens* (Fabr.), Lunar Marbled Brown *Drymonia ruficornis* (Hufn.), White-marked *Cerastis leucographa* (D. & S.) (one individual in the quarry and nine in the Robinson trap (the largest number the leader has ever recorded in one trap), Twin-spotted Quaker *Orthosia munda* (D. & S.) and Powdered Quaker *Orthosia gracilis* (D. & S.). These were largely additional species to those recorded in 1979 because the visit was two months earlier than any of the others.

The second visit of 1984 was on July 29. The weather conditions on this night were perfect. The air was calm and muggy, with light cloud and it was the dark of the moon. The temperature was 22°C at dusk, 18°C at 22.00h and the minimum during the night was 10°C. The Robinson trap in the car park captured in excess of 3000 macro-moths! The total list of macro-moths for the night was 124 species.

In March 1987 the leader moved from the Oxford area to Peterborough to take up the post of National Moth Specialist for the Nature Conservancy Council (NCC), as it then was, but he was soon back visiting the Warburg reserve, in the early 1990s, in connection with the first national survey of the nationally scarce Striped Lychnis moth *Shargacucullia lychnitis* Rambur which he undertook for one of the successor organisations, the Joint Nature Conservation Committee, following the reorganisation of the NCC (see Waring 1992). Rod D'Ayala, who was then employed on the reserve staff at Bix, got very interested in counting the larvae of the Striped Lychnis on the reserve, and following a field visit together, he sent me the results of his further searches annually. The larvae are still looked for annually to at least record their continuing presence, by Rod's successor, Giles Alder, who has now been working on

the site for eight years. Until 2009, my caterpillar hunting for the Striped Lychnis was my most recent visit to the reserve.

Returning to the reserve at Bix on June 27 2009 for the combined BENHS field meeting and Watch Group event was a real trip down memory lane and also turned into a party. Ron Louch from the 1979 trips was unable to make it, but only because he was very busy with the bird-nest recording season and had a large number of nests he was following through for the British Trust for Ornithology. He is alive and well. David Hastings attended. He was with me on that original school trip in the early 1970s. My wife Rachel Thomas and eight year old daughter Kirsty accompanied me. Rachel was my new girlfriend in the spring of 1984 and stayed in a caravan with me on site on the July visit in 1984 and we had a great time, as you can imagine! This 2009 event was Kirsty's first visit on the reserve, and a fine adventure. We were also joined by Mary Elford, who attended her first BENHS field meeting in 2008, on Otmoor, and enjoyed it so much she was back for more in 2009, having also attended our meeting at Aston Rowant NNR the previous weekend. It was also a pleasure to have our new BENHS President Brian Elliot with us. Brian had visited this reserve previously about ten years ago, with my old Ph.D. supervisor, the late Denis Owen. My visits in 1984 had been part of my fieldwork for that Ph.D. so this was another tie in with the past. Finally, Nigel Phillips, who was an influential encouragement to me in the early 1970s when I was laying the foundations for my career in nature conservation, and who had become the reserve manager at Bix by the time of my visits in1979, still happens to live on site, with his wife Janet, though now working for BBOWT off-site in a different capacity. Nigel and Janet invited us to Sunday lunch, which we were all able to eat while sat around a table outdoors because the weather was so hot and sunny. Many old shared memories were relived during the meal, I can tell you. And for the record, the photograph on the cover of both editions of the AES Guide to Moth-traps and their Use (Fry & Waring, 1996 & 2001), of me sorting through a catch of moths in a Robinson trap, was taken on one of those mothing trips to Bix in 1979.

On our arrival just before dusk for the start of the meeting, we were all met by Giles Alder, who showed us around, and we selected our sites for the moth traps and settled in. Since my last visits additional reserve buildings have been constructed. There is now a small hall that can be used for illustrated presentations and training events, but can double as accommodation, of which we had the full use, spreading our equipment out and setting up camp beds for the night. Mary pitched her tent alongside the hall for independence. We set up the light-trap owned by the reserve, on a cable from the hall, on the edge of a cleared area and track surrounded by a wide selection of trees and scrubs, at grid reference SU 71937 87828 (+/−3 m) according to the leader's new Garmin GPSmap 60CSx unit. The trap was a Skinner pattern with 125W MBF/U bulb. In the morning it contained 129 macro-moths of 56 species.

My aim with the two Robinson traps I had brought along was to put them as near as possible to the sites on which I operated my single Robinson and Heath traps back in 1979. The Robinson trap had been in the visitor car park in those days, but this was now full of cars, so my first Robinson was placed 10 m away in an adjacent grassy area with picnic tables, separated from the car park by a low hedge, at SU 720 878. This was just within reach of the same 50m cable from the visitor centre which I had used in 1979. My second Robinson was set up on the same bank as my Heath trap in 1979, also on a cable from the visitor centre, near a greenhouse not there in 1979. The position of the trap was SU 720 878. In the morning these traps held 178 macro-moths of 63 species at the car park and 225 macros of 60 species on the bank, respectively. My impression was that the traps contained fairly small catches, but of a considerable variety of species.

For a contrast in habitat, I placed my 6W actinic trap within adjacent woodland containing tall oaks, beech and other trees and under-story shrubs. In the morning this trap held 50 macro-moths of 27 species, including one individual of the Fern *Horisme tersata* (D. & S.) which was not seen in any of the above traps, and a Phoenix *Eulithis prunata* (L.), which was only seen elsewhere as a single individual in the adjacent car park trap.

Brian Elliot was the only other person with traps. He had three 125W traps with him and set them up in promising open places, one on the old rifle range near the visitor car park and two in the broad rides in the adjacent woodland just beyond.

It was one of those nights when the weather was totally in our favour. It was calm, mild, cloudy, muggy but dry. The dusk temperature measured by two of the traps was 17°C and 14°C, though further into the reserve 22°C was recorded, and the minimum for the night was 11°C, as measured on the ground by the traps, but without the cool breeze and clear sky of the previous weekend at Aston Rowant, it certainly felt warmer and more sheltered than at that event. It was obvious we were going to see a lot of moths because as dusk fell there were soon a number around the traps and others were seen on the wing. Most of the party set about getting to bed, in preparation for an early start in the morning to inspect the catches before the sun came up and warmed the moths. A female glow-worm *Lampyris noctiluca* L. was noted shining her little green light near the accommodation at 22.30 h, so before Kirsty went to sleep on her late night up, she was able to come out and see one of these insects for her first time.

Unfortunately this was when the second of the two minor hitches on this field meeting occurred. The first had been that Kirsty suffered a brief attack of diarrhoea en route to the meeting, probably due to the hot journey in the car. This had delayed our plans for the day a little, and we arrived late by about half an hour. However, with Giles already at the reserve to meet everyone, Kirsty evidently in better shape on arrival and now sleeping well in bed, and all the light-traps up and running well before dusk, all was fine on that front. Then Brian came up to me out of the darkness to report that a moth had flown into his ear and that his best course of action was to set off for the nearest hospital.

With Brian leaving and taking his traps home during the night, we never managed to use the GPS to provide their precise grid refs. Nevertheless, in total with all the micros Brian had recorded by various means since his arrival, he managed to record a total of 170 species of moths before his visit was curtailed.

David and I were awake and up at 5.00 h to start recording the catches. First we closed up all the traps and recorded the moths on the outsides and in the surrounding vegetation. Then all the traps were moved to shady places and we worked together through each trap in turn. It took us just over four hours to deal with our four traps, counting and recording all the moths individually, with David photographing many of the more localised species with which he was not familiar. Our total for these four traps was 582 macro-moths of 102 species. The catches included the nationally scarce Great Oak Beauty *Hypomecis roboraria* (D. & S.) (one fine male in the car park trap), three individuals of the nationally scarce Striped Lychnis (all in the trap on the bank, where there were several examples of the larval foodplant, Dark Mullein *Verbascum nigrum*, in flower), three Orange Footman *Eilema sororcula* (Hufn.) (all worn, at hall and bank sites), that lover of chalk and limestone: the Royal Mantle *Catarhoe cuculata* (Hufn.) (one, on the bank); the Small Yellow Wave *Hydrelia flammeolaria* (Hufn.) (one, on the bank); the *Clematis*-dependent Fern (one, in the woodland) and Pretty Chalk Carpet *Melanthia procellata* (D. & S.) (singletons at all four traps). We had numbers of the Beautiful Hook-tip (including fifteen at the car park trap), Brown Scallop *Philereme vetulata* (D. & S.) (including six at the car park trap) and

a single Dark Umber (on the bank), like the Brown Scallop dependent on purging buckthorn *Rhamnus catharticus* L. which is plentiful in this reserve. The catches also included the Blotched Emerald, Mocha *Cyclophora annularia* (Fabr.), Treble Brown Spot *Idaea trigeminata* (Haw.), Phoenix, Large Twin-spot Carpet *Xanthorhoe quadrifasiata* (Clerck), Common Lutestring, Privet Hawk-moth, Coronet *Craniophora ligustri* (L.) (mainly the dark green form), Miller, Green Arches, Large Nutmeg, Clouded Brindle and Leopard Moth, all species still of local interest.

Together with the three Reddish Light Arches which were recorded by Brian, we had succeeded in recording 14 (56%) of the 25 most localised of the species found in 1979 and listed above. The species seen on this single 2009 field meeting are marked with an asterisk. To find most of the remaining noteworthy species from 1979 which we did not see on this 2009 visit, one would need to return in July and August, as in 1979.

Note that the Royal Mantle was represented by just one individual, resting on the outside of the collar of the trap, near the entrance cone. Had the trap not been inspected until 07.00 or 08.00 h, it might very well have flitted off as the day warmed up. This is not a species I had recorded on the Warburg reserve before, but it is on the master-list, so it had evidently been noted by someone else prior to 1988. Baker (1994) considered it scarce in Berkshire during the 1970s and 1980s. I seldom saw it in Oxfordshire in those years, but found it on two sites: the chalk grassland at Aston Rowant NNR in 1979 (one on 4 July and three on 13 July) and also on the smaller, western of the two areas of limestone grassland at Sydlings Copse BBOWT reserve (one individual in 1979, on 23 July).

Examining the master-list, supplement, and a recent print-out for the Warburg reserve indicates that none of the macro-moth species we recorded at our 2009 event were new for the site, though some may not have been seen for some years.

It was a real pleasure to see the three adults of the Striped Lychnis moth in the light-trap catch because I had only ever seen the species on this reserve as larvae. It is also a species I consider with the fondness of an old friend, because of all the time I have spent surveying it from 1990 onwards. These adults at Bix were characteristically smaller, slighter and paler than the Mullein moth *S. verbasci* (L.), with the slightly truncated shark-fin-like thoracic tufts well-illustrated in Waring, Townsend & Lewington (2003). The flight period of the Mullein moth was long-since over, with larvae fully-grown and pupating in my Peterborough garden at the time – one larva of which I had brought along to show the children in this context. Giles was looking forward to seeing his first Striped Lychnis larvae of the year at Bix in the coming weeks. Brian pointed out that during the late 1970s the verges of the stretch of road known as the Fair Mile, on the route to Henley, used to support a large population of Striped Lychnis caterpillars, but that it is now too closely mown to be of use.

Most of the macro-moths which Brian was able to record were the same as those in the morning catches, but noteworthy additions include a larva of the Yellow-horned *Achlya flavicornis* (L.) found on birch while searching for the mines of micro-moths, two Haworth's Pug *Eupithecia haworthiata* Doubl. near *Clematis* along with more examples of The Fern, one Wood Carpet *Epirrita rivata* (Hbn.), a few Heart & Club *Agrotis clavis* (Hufn.), and a few Scarce Silver Lines *Bena bicolorana* (Fuess.).

Amongst the eighty species of microlepidoptera Brian recorded are a number of additions for the site. Most noteworthy amongst the records are the tortricid *Gynnidomorpha luridana* (Greg.), one adult, and four adults of *Epiblema tetragonana* (Stephens) which is dependent on dog rose *Rosa canina* and close relatives. In addition a gelechiid seen by Brian eluded capture but might well have been *Gelechia rhombella* (D.& S.) which is dependent on Crab-apple *Malus sylvestris* (L.) and

Fig. 1 Watch Group at Bix Bottom, 27 June 2009.

domesticated *Malus* and if these are present on the reserve, it would be worth searching them for this moth.

No sooner had we completed recording the catches and returned them on egg-boxes back into the traps, and then had a quick breakfast of milk and cereal, when the children (a dozen of them) from the Watch Group arrived at the appointed time of 09.30 h. We all went through the catches together, examining and releasing the moths, talking about them and allowing everyone a chance to handle them and observe them at close range. We also had a session on caterpillars, looking at some final instar larvae of the Eyed Hawk-moth *Smerinthus ocellata* (L.), Mullein Shark and Emperor moth *Saturnia pavonia* (L.), which the leader had brought with him (Fig. 1). This was followed by a game of blind-man's bluff led by Giles in the shade of the woodland to let the children burn off some energy in the cool. We concluded with session on the former rifle range within the reserve where we simultaneously tried using pheromone lures to record the Six-belted Clearwing *Bembecia ichneumoniformis* (D. & S.) around bird's-foot trefoil, and the Orange-tailed Clearwing *Synanthedon andrenaeformis* (Lasp.) and Yellow-legged Clearwing *S. vespiformis* (L.) around wayfaring tree, oaks and sycamore, while beating trees and shrubs for larvae of other moths. This took place from 11.30–12.30 h in hot, sunny weather. We found no clearwings at all, which was a big surprise to me as a leader with a decade of experience of luring clearwings. This was the first time pheromone lures have been tried for clearwings or any other species on this reserve, so there are no prior results here for comparison. Furthermore, there appear to be no clearwing records for the reserve, collected by any technique, according to the master-list for the reserve and the supplement. The

leader remains hopeful that all three of the above clearwings will be found on this site however, probably by using clearwing lures a week or two later than the date of this meeting.

A few larvae were found during a brief and rather cursory beating by the children, using one Bignell tray, before the Watch Group session came to its appointed end at 12.30h as the parents began to arrive to collect their offspring. The larvae included the Clouded Drab *Orthosia incerta* (Hufn.), Brindled Beauty *Lycia hirtaria* (Clerck) and Buff Footman *Eilema depressa* (Esp.), all from birch, as well as several sawfly larvae.

All the children agreed that they had had an enjoyable and interesting experience. They were particularly and understandably impressed that they had seen the largest resident British moth – the Privet Hawk-moth. It was evident from their questions that some had a well established interest in moths and had some practical experience, as well as having read about some of the species we saw. This meeting was certainly enjoyed by all the adults, and even Brian, after he had been relieved of the moth in his ear, expressed an interest in returning to this site! Brian has resolved to put cotton wool in his ears when attending light-traps in future, while also reporting that this is the first time in fifty years of moth-trapping that a moth has so afflicted him.

The leader thanks Kelly Thomas for the original invitation, Giles Alder for his welcome and all the help with the co-ordination, and in the field, Nigel & Janet Phillips for inviting us to lunch, and all the hospitality and memories, and all the above-mentioned adults and children who supported this meeting and made it so enjoyable and worthwhile in all sorts of ways additional to the useful moth data collected.

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Dungeness NNR, Kent, 25 July 2009

Leaders: **Geoff Allen** and **John Badmin**. – Twenty or so members turned up for this joint meeting of the Kent Field Club and British Entomological and Natural History Society. We assembled outside the new RSPB educational and viewing centre and then set off for the recently created clover meadows to the north which have been sown in readiness for the re-introduction of the nationally extinct Short-haired bumblebee *Bombus subterraneus* (L.). Dr Nikki Gammans who is running the project on behalf Natural England and the Bumblebee Conservation Trust with support from other invertebrate conservation organisations was unfortunately unable to attend but gave us good instructions on the most interesting sites to visit.

The coleopterists led by Eric Philp managed to reach the area first and were able to report that numerous beetle species were present both among the clover and vetch rich meadows and in the nearby dykes. The main group under the leadership of Geoff Allen proceeded at a slower pace. The crabronid wasps *Cerceris arenaria* (L.) and bee wolf *Philanthus triangulum* (Fabr.) and the sphecid *Ammophila sabulosa* (Fabr.) were noted in open ground. Largish numbers of the froghoppers *Aphrophora salicina* (Goeze), *Philaenus spumarius* (L.) and *Neophilaenus lineatus* (L.) were found in the bushes and herbage by the footpaths as well as occasional specimens of Roesels' bush-cricket *Metrioptera roeselii* (Hagenbach) and Long-winged conehead *Conocephalus discolor* (Thunberg). A yellow *Lasius* nest typical of the area was investigated due to its proximity to a nest of the local ant *Tetramorium caespitum* (L.) and it was concluded this might be *Lasius myops* (Forel) should it prove to be a distinct species from *L. flavus* (Fabr.).

By the time we reached the meadow area the wind had increased sufficiently to restrict insect movement to larger stronger flyers. The usual widespread bumblebee species were observed, but we were also pleased to note individuals of *B. rupestris* (Fabr.) and *Megachile maritima* (Kirby). The co-leader stayed on here to sample the wetter habitats for Auchenorrhyncha, and on returning alone, fatefully took a wrong turning necessitating a 2 mile walk round some large bird ponds to the visitor centre, although he was able to record the local psyllid *Psylla hippophaes* Förster on sea buckthorn.

The wind really began to blow from lunchtime onwards and so a much reduced party walked to the ARC pits on the north side of the main Lydd road. This area is remarkable for extensive patches of creeping willow *Salix repens*, an otherwise very local plant in Kent. The highlight of the day was observing the behaviour of a female RBD1 spider wasp, *Evagetes pectinipes* (L.), a putative kleptoparasite of *Episyron rufipes* (L.) (not seen on the day). This species was first recorded in Britain in 1963 from Deal sandhills and subsequently along the east Kent coastline, with no further records until about a decade ago (see Allen, G. W. 2009. *Bees, wasps and ants of Kent* for more details). A flurry of recent records including its discovery in Essex by Adrian Knowles suggest in may be slowly spreading in the region.

Paul Wheeler braved the stiffening breeze in the evening and set his light-traps near the ARC gravel pits as these had been little studied. Despite the conditions he recorded over 70 species of Lepidoptera, noting at times that he felt he was watching a migration as almost every moth was flying up from the lake. Those that put in appearance included eight wainscots – *Mythimna straminea* (Treit.) (Southern Wainscot), *M. impura* (Hübn.) (Smoky Wainscot), *M. pallens* (L.) (Common Wainscot), *M. comma* (L.) (Shoulder-striped Wainscot), *M. conigera* (D.&S.) (Brown-line Bright-eye), *Nonagria typhae* (Thunberg) (Bulrush Wainscot), *Archanara sparganii* (Esper) (Webb's Wainscot), *A. dissoluta* (Treit.) (Brown-veined Wainscot) and *Simyra albovenosa* (Goeze) (Powdered Wainscot or Reed Dagger). Among the larger moths were *Euthrix potatoria* (L.) (Drinker), *Pterostoma palpina* (Clerck) (Pale Prominent), *Lygephila pastinum* (Treit.) (Blackneck), *Agrotis vestigialis* (Hufn.) (Archer's Dart) and the nostalgia species Garden Tiger and Magpie. He was pleased to record the extremely beautiful Dungeness speciality pyralid *Cynaeda dentalis* (D.&S.) and *Ethmia bipunctella* (Fabr.) which were new to him.

There were several species of caddis noted during the visit, the most interesting of these being the leptocerid *Mystacides longicornis* (L.).

Thanks go to Bob Gomes, the RSPB manager, for allowing us to visit and record on the reserve.

Pattiland Farm, Devon, 8 August 2009

Leaders: **Brian Bewsher & Roy McCormick**. –This event was moved from 18th July to this date because of bad weather on the original night. Several members of the Devon Moth Group attended, bringing six light-traps between them. The trap equipment was loaded onto a tractor box and taken to the designated site on the farm. This was located on the edge of a field by old established trees of oak, ash, alder and willow along with understory, by a stream which eventually feeds into the Okement river near Monkokehampton around four miles to the west. The farm owners Rod and Sylvia Wareham, erected a large tent in an adjacent field as a refreshment area, and rigged up a digital camera attached to a TV screen so that the moths taken could be viewed by everyone; an excellent arrangement which showed the various moths in their full glory.

After the traps had been assembled, it was decided to start them running so we could attract a few species in before more people arrived. Once everyone had assembled Roy McCormick (Devon County Moth Recorder) talked about the particular risks associated with moth trapping; this was on top of the risk assessments that had already been prepared for everyone by Rod and Sylvia. The night was dry, but with a near full moon, and as the evening wore on it became quite chilly. There were a few species in the traps on the first round with a couple of these faring better than others, but the numbers of moths were few; a couple of rounds were carried out with several species being captured in containers so they could be displayed on the TV screen. We repaired to the refreshment tent for hot soup and rolls, with the first captives being shown on the viewing set-up, with the leaders giving the names of each one and answering questions. After refreshments we toured round the traps again and collected more species, but by this time, we had said our goodbyes to a couple of the visitors and the chill set in. These latest captures were shown to the audience via the TV monitor and further soup and rolls were served. The people who came expressed their thanks for a very enjoyable evening having seen species they never knew existed. We then decided to pack up once everybody had left, as the night was now definitely chilly. The list reached a mere 38 species, which increased to 39 when we arrived back at the farm house and found a Common White Wave attracted to the tungsten light. The best of this bunch were: 1 *Trachycera advenella* (Zinck.); 1 *Ligdia adustata* (D. & S.) (Scorched Carpet); 6 *Xestia sexstrigata* (Haw.) (Six-striped Rustic) and 1 *Hydraecea micacea* (Esp.) (Rosy Rustic). We finally left the site at around 01.00 h having thanked our hosts for a very organised and welcoming evening of moth recording.

Yonder Hill, Colaton Raleigh, Devon, 15 August 2009

Leader: **Roy McCormick**. – The night promised to be dry and remained so, with the temperature at a reasonable level for the time of year. Ten people attended of whom six were members of the Devon Moth Group and brought five light-traps. The leader gave his customary talk about the ‘dangers’ of moth trapping from the prepared health and safety assessment and Judy McKay, the owner, helped us to wheelbarrow kit to areas she thought would be productive. We had left dusking a bit late as it was already getting dark, so we waited around half an hour before starting our round of the five traps. We had all been complaining about the lack of moths at our traps, but on this night they were absolutely heaving by the time we had been round them a couple of times. These were mostly all the common species such as Large Yellow Underwing; Flame Shoulder; Setaceous Hebrew Character; Lesser

Broad-bordered Yellow Underwing; Common Rustic agg. and Straw Dot; it was an absolute maelstrom of these things hacking around the traps disturbing everything else, but we managed to pick out a goodly list albeit ingesting a few small flies and shaking moths from our clothing as we went. Judy supplied refreshments from a caravan parked permanently on the site and we enjoyed cups of tea and coffee, with freshly cooked chipolatas in rolls and biscuits to follow.

After our repast, it was back to the mêlée and by this time, around 23.00 h, the numbers of incoming moths had lessened and we were able to pick out extra species more easily, but 'ye thuggy' Large Yellow Underwing and Flame Shoulder were still bashing around. Some of the guests then decided to leave, and as things had mainly settled down by midnight, it was finally decided to pack up. The total number of species including microlepidoptera identified at home afterwards reached a very respectable 90. The best of these were: 3 *Euzophera pinguis* (Haw.); 2 *Eupithecia tenuiata* (Hübn.) (Slender Pug); 2 *Eupithecia succenturiata* (L.) (Bordered Pug); 1 *Pachycnemia hippocastanaria* (Hübn.) (Horse Chestnut); 2 *Cleorodes lichenaria* (Hufn.) (Brussels Lace); 1 *Lithosia quadra* (L.) (Four-spotted Footman); 6 *Euplagia quadripunctaria* (Poda) (Jersey Tiger) (with a couple of the form ab. *lutescens* amongst them); 1 *Plusia festucae* (L.) (Gold Spot); 1 *Abrostola triplasia* (L.) (Dark Spectacle) and 1 *Laspeyria flexula* (D. & S.) (Beautiful Hook-tip). We left the site at around 01.00 h, having seen more moths this night than we had seen for a long time.

Chudleigh Knighton Heath, Devon, 22 August 2009

Leader: **Roy McCormick**. – What a difference a week and change of venue makes; after the maelstrom of moths at Colaton Raleigh, this meeting proved to be far less fruitful. The leader arrived at one of the official parking areas early, in order to secure a place. Twenty-four people turned up eventually, seven of whom were members of the Devon Moth Group with five traps. Vehicles filled the two parking places and along the edge of the road in the triangle section of the junction. Moth traps were positioned on either side of the roads and started as darkness descended.

We started our rounds with all these people in tow but it was not easy trying to hand round specimens in pots so that everybody could see and hear the names of the various species. The list increased slowly, with the lack of numbers being a feature of this event. A couple more rounds were undertaken and by then a few of the people had said their good nights, which made the situation more manageable. The list by this time had built to around 50, with only *Agriphila straminella* (D. & S.); Large Yellow Underwing and Lesser Broad-bordered Yellow Underwing making double figures. With the added microlepidoptera that had been taken home to confirm identities, the list came to 62 with the best of these: 1 *Argyresthia bonnatella* (L.); 1 *Acleris cristana* (D. & S.); 8 *Epinotia trigonella* (L.); 1 *Agriphila latistria* (Haw.); 1 *Pyrausta despicata* (Scop.); 1 *Melanthia procellata* (D. & S.) (Pretty Chalk Carpet); 1 *Xestia baja* (D. & S.) (Dotted Clay) and 1 *Apamea unanimis* (Hübn.) (Small Clouded Brindle).

Luckily the rain stayed off, but one member of the DMG who lives nearby said that it had bucketed down in the afternoon, which might explain the lack of moth numbers in the hours that followed, but, all things considered we managed a respectable list as well as raising awareness of moths and moth recording among many new people.

Berry Head, Brixham, Devon, 18 September 2009

Leader: **Roy McCormick**. – Of the two days planned for National Moth Night, 18th and 19th September, 2009, this one looked the better. The difficulty was

getting all who came through the site barrier to the under-cliffs which was operated by a special card; but this was eventually achieved successfully. Eighteen people attended bringing ten traps and these were spread around the site as it was getting dark.

A little dusking was conducted resulting in a surprise capture of a specimen of *Leucochlaena oditis* (Hübn.) (Beautiful Gothic) which was brought to the leader, because I had not seen this species for many years and had to get the identification guide out; a complete surprise for our chairman, Richard Fox, as he had never seen me get a book out before. Moths came in in dribs and drabs with very little of excitement, so the list built slowly. A couple of the traps were in a windy situation and were getting very little, with the best ones in the rough ground further in, although the temperature remained at around 12°C all night. Around 23.00 h, people started to find moths climbing up grasses and these were identified as more *L. oditis*, with some appearing to be newly emerged as they were ejecting meconium; both males and females were found. Several further rounds were carried out with the list hardly increasing and by around 23.30 h, it was decided that we should pack up for the night. A couple in the party decided to move their traps from a windy situation up the track a bit after we had all gone. As soon as they did this, several more *L. oditis* flew in and it was estimated, with the ones seen already, that we had recorded around 30 of this very beautiful RDB moth. The list before these traps were moved stood at around 26 species, but after these had been run for an hour or two, this number increased to 36, with the best of these: 3 *Agonopterix rotundella* (Doug.); 1 *Epinotia bilunana* (Haw.); 30 *L. oditis* (Hübn.) (Beautiful Gothic), the best moth of the night; 1 *Amphipyra berbera svenssoni* Fletcher (Svensson's Copper Underwing) and 1 *Schrankia costaestrigalis* (Steph.) (Pinion-streaked Snout). Overall quite a good night with a half decent list, which, with our highlight, Beautiful Gothic, making it a night to remember.

CONSERVATION NEWS

Introduction

During the past year, the President, Brian Elliott and members of Council have been in discussion with Buglife (The Invertebrate Conservation Trust) to improve links between the two organisations. One of the outcomes was an agreement by Buglife to provide the Society's journal with brief reports on some of the latest news and developments in the field of invertebrate conservation particularly in relation to the UK, Ireland and the Channel Isles. The first report has been compiled by Craig Macadam, who is Buglife's Conservation Officer for Scotland and until recently the Royal Entomological Society's Regional Secretary for Scotland. It is not surprising therefore that his first report focuses on saving the invertebrate fauna of Aucheninnes Moss in Dumfrieshire. His area of expertise is in aquatic invertebrates, particularly mayflies for which he is the UK National Scheme recorder. His last report fittingly focuses on aquatic systems and the agreed withdrawal of an ectoparasiticide sheep-dip containing the synthetic pyrethroid, cypermethrin, owing to its increasing contamination of river systems in the UK

Captive breeding success for rare Scarlet malachite beetle

The Scarlet malachite beetle *Malachius aeneus* (L.) was once widely distributed across southern England and south Wales. Buglife and volunteer entomologists have

been surveying Scarlet malachite beetle sites since 2004 to record where the surviving populations are and to assess the health of the biggest populations. These surveys (part funded by the British Entomological & Natural History Society) have shown that it is now found on just eight small sites in southern England.

The tiny metallic red and green adults appear for only four weeks in May and June where they rely upon nectar sources in wildflower meadows. Little is known about the larval requirements so a captive breeding experiment was established. Gravid females were collected and placed into a series of tanks containing different substrates (dead wood, thatch, bare soil, etc.) which were thought to potentially be used as oviposition sites. The beetles were monitored whilst still alive and the tanks were monitored over the winter for the appearance of Scarlet malachite larvae. The only tank to produce adults contained old hay/thatch and the next stage is to repeat the trial with this substrate to identify the optimal conditions for breeding.

Aucheninnes Moss Saved from Destruction

A classic lowland peat bog with wet heath areas, Aucheninnes Moss is the last remaining relict of the once extensive Barclosh Moss complex in south west Scotland. Various developments and afforestation have destroyed the other bogs in the area, leaving Aucheninnes as a last refuge for threatened plants and invertebrates. The bog's primary biodiversity importance comes from the invertebrate fauna, which includes: Large heath *Coenonympha tullia* (Müller); Small pearl-bordered fritillary *Boloria selene* (D. & S.); Sorrel pigmy moth *Enteucha acetosae* (Stainton); and Bog bush cricket *Metrioptera brachyptera* (L.), the latter two species are now found nowhere else in Scotland.

In 2002 Dumfries and Galloway Council proposed digging out the bog and turning it into a landfill tip. Buglife led a campaign to save the Moss. Unfortunately despite these efforts and a Motion in the Scottish Parliament signed by 40 MSPs, the Scottish Ministers granted permission for the development.

Six years later the landfill has not been extended, and the Council has decided to close the facility at Aucheninnes completely. While a reduction in general waste enabled the decision, it was acknowledged that the peat bog at Aucheninnes Moss is a UK BAP priority habitat, is the only Scottish site for the nationally scarce Bog bush cricket and that replacing this habitat would be difficult and expensive.

Dutch Lepidoptera Declines

Amongst many important conservation papers presented at Butterfly Conservation's 6th International Symposium in March 2010 were two studies of Lepidoptera in the Netherlands.

An analysis of moth records by Dutch Butterfly Conservation and the Amsterdam Zoological Museum has revealed that 70% of species are declining and there has been a 35% overall decline in abundance of moths. The similarities between this and results obtained from the Rothamsted Insect Survey light-trap network in the UK are clear.

Meanwhile work by Dutch Butterfly Conservation and the Wageningen Museum suggests that the decline of some butterfly species could be linked to declines in nectar availability in the countryside.

Full papers will be published in the Symposium proceedings.

New EU target for biodiversity

The European Union 2010 target to halt biodiversity loss runs out this year. Some countries have argued that we should not have another target and many countries have argued for a more 'flexible approach'. Over the past few months the EU states have been debating what to do. Buglife, Butterfly Conservation and the other wildlife charities have been pushing for a strong biodiversity target.

On the 15 March the EU Environment Council announced that it has agreed to the following:

Vision

AGREES on a long-term vision that by 2050 European Union biodiversity and the ecosystem services it provides 'its natural capital' are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided;

Target

For this vision to be achieved AGREES further on a headline target of halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.

This is not perfect but it is the strongest of the four options that were on the table. This decision is in part a result of all the pressure and awareness raising by conservation organisations over the last five years and should keep biodiversity on the political agenda for another decade. The new EU 2020 target should be confirmed by Heads of State in June; the next challenge will be to secure a strong global target in September.

Biodiversity Conservation in England

The Biodiversity Action Process in the UK is being devolved and UK delivery roles are coming to an end. In England a new group, the England Biodiversity Strategy Invertebrate Group (EBSIG), has been established to rebuild momentum to conserve the 398 invertebrate species on the UK BAP list.

The EBSIG is working on two fronts at the moment. Firstly working with other bodies that have been set up to integrate and deliver biodiversity action so that together we can make sure that the action needed to conserve the Priority invertebrates species is defined, allocated and delivered.

Secondly the group is establishing a role of England Lead Partner to replace the now defunct UK Lead Partner role. Although the Government has not identified new resources to address the new priorities it is very important that people are empowered to take action for the most endangered species. The role is being redefined and there will probably be more teams of Lead Partners sharing skills and helping each other to understand and deliver the needs of the species.

Buglife is keen to hear any views on the role of Lead Partner; what worked and what did not last time; how we can do better this time; and even initial suggestions for possible lead partner organisations.

UK BAP Priority species information resource

Buglife is currently planning an exercise with EBSIG, Scottish Natural Heritage and the Countryside Council for Wales to gather together information on the ecology of, threats facing, and solutions needed for all the UK BAP Priority species. We will put together some basic information ourselves and then put it out to contractors and leading societies to quality assure the information and fill the gaps. If you would like to discuss this work please contact Duncan Sivell (duncan.sivell@buglife.org.uk).

Lost Life

Natural England recently launched the report 'Lost Life'. This report identifies nearly 500 animals and plants that have become extinct in England – practically all within the last two centuries. It is important because it emphasises that extinctions are happening here, not just in the Amazon or on coral reefs, and raises the profile of the issue with the public. It is also important because it marks a public commitment by Natural England to support the conservation of endangered species in the future.

Buglife is concerned that the recent JNCC decision to no longer provide any funding for Red Listing in the UK is likely to make it considerably harder in the future to know which invertebrate species have gone extinct and which are rare or threatened.

Wildlife Destroying Sheep Dip Finally Withdrawn

Synthetic pyrethroids (specifically cypermethrin) are 100 times more toxic to aquatic wildlife than the organophosphate insecticides that they were brought in to replace. When in use it was estimated that about 1.5 billion invertebrates in rivers, streams and ponds were being killed by cypermethrin sheep dip every year. In addition 400 million litres of diluted waste cypermethrin sheep dip was allowed to be spread onto meadows and fields every year, causing further damage to invertebrate populations.

Following a campaign led by Buglife and fishing charities to ban sheep dipping with synthetic pyrethroids, the Veterinary Medicines Directorate (VMD) suspended the licence to sell synthetic pyrethroid for sheep dipping on environmental grounds in 2006. It has taken a further four years to make the ban permanent.

Studies coordinated by the Environment Agency and Veterinary Medicines Directive revealed that the chemical was even more toxic than had been feared. It was found that just a single sheep walking through water nine cm deep two days after it had been dipped released so much cypermethrin that it would cause a pollution event in a river.

Craig Macadam

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THE MAITLAND EMMET BENHS RESEARCH FUND

In 2001 the family of the late Lt. Col. Maitland Emmet, a distinguished amateur microlepidopterist, made a generous donation to the Society's Research Fund in his memory. As a result the Society has renamed its Research Fund the Maitland Emmet BENHS Research Fund. The Society is very grateful to the Emmet family for their generosity.

The Society invites applications for grants, from the Maitland Emmet Research Fund, to be awarded in January 2011. Awards are open to both members and non-members of the BENHS and will be made to support research on non-marine arthropods, with reference to the British fauna, and with preference given to insects, arachnids, myriapods and isopods. Grants will be given for:

(a) the assistance of fieldwork on non-marine arthropods with relevance to their conservation,

(b) work leading to the production of identification guides and distribution lists, but not the cost of publishing such items.

Travel to examine museum collections and to consult taxonomic specialists would be included. The work and travel is not limited to the British Isles but must have a demonstrable relevance to the British arthropod fauna. Individual grants are unlikely to exceed £500.

Preference will be given to work with a clear final objective (e.g., leading to publication or the production of a habitat management plan). Work on leaf miners and gall forming insects should be submitted to the Society's Professor Hering Memorial Research Fund.

Applicants should send seven copies, if possible, of their plan of work, the precise objectives, the amount for which an award is requested and a brief statement outlining their experience in this area of work, to **Dr J. Muggleton, 17 Chantry Road, Wilton, Salisbury, Wiltshire SP2 0LT**, as soon as possible and not later than 30 September 2010. Further information may be obtained from the same address (email: jmuggleton@aol.com).

THE PROFESSOR HERING MEMORIAL RESEARCH FUND

The British Entomological & Natural History Society announces that awards may be made from this Fund for the promotion of entomological research with particular emphasis on:

(a) leaf-miners

(b) Diptera, particularly Tephritidae and Agromyzidae

(c) Lepidoptera, particularly Microlepidoptera

(d) general entomology

in the above order of preference having regard to the suitability of applicants and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary for fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £1000 in the year 2011.

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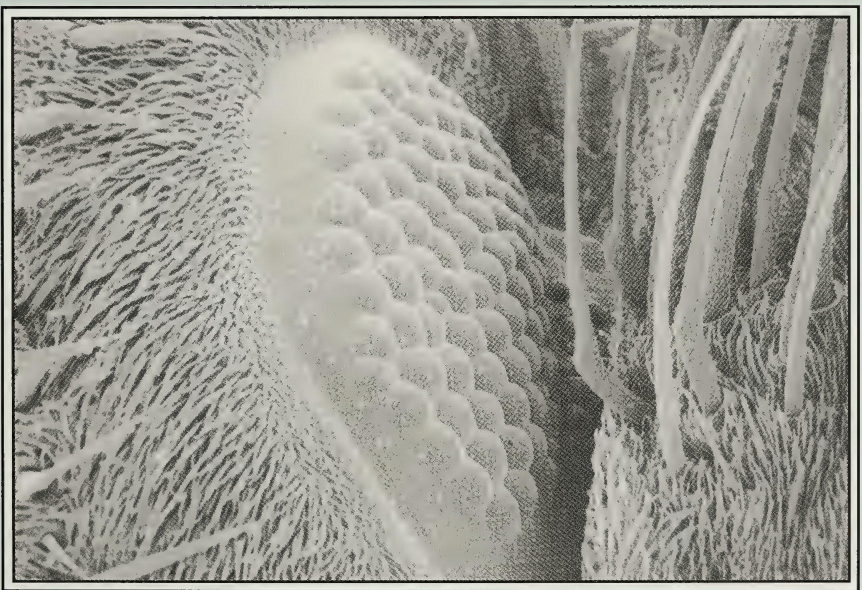

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FLOWER CONSTANCY AND EFFICIENCY OF NECTAR FORAGING BY THE RED-TAILED BUMBLEBEE *BOMBUS LAPIDARIUS* (HYMENOPTERA: APIDAE)

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ABSTRACT

The foraging behaviour of *Bombus lapidarius* (L.) was studied over a five week period during June and July 2005. The main aim was to determine whether the efficiency of nectar collection by *B. lapidarius* was influenced by levels of flower constancy. Two plots were monitored around the Writtle College estate: the first, a homogeneous control plot of blue-flowered cornflower *Centaurea cyanus* and the second a mixed flower plot comprising corncockle, corn marigold, corn chamomile, common poppy and 25% *C. cyanus*. Flower constancy to *C. cyanus* (the number of successive visits made to individual plants of this species) was recorded at 100%, both in the mixed plot and control plot. The reasons for the unexpected high fidelity to cornflower in the presence of other potentially attractive flower species are discussed. The efficiency of nectar collection (the percent of time spent on flowerheads ingesting nectar) was approximately 9% lower in the mixed plot primarily as a result of the need to forage over greater distances between flowerheads containing nectar sources. It is suggested that whilst individual worker efficiency in the collection of nectar is desirable, colonies may accept a degree of inefficiency as a trade-off against the ability of the colony as a whole to exploit the wider landscape and all potential sources of nectar.

INTRODUCTION

The Red-tailed Bumblebee *Bombus lapidarius* (L.) is a widespread and common species in the UK. Conservation measures in the UK for invertebrates such as bumblebees have often focused on the provision of additional forage by means of pollen and nectar mixes sown into agricultural areas (MAFF, 2000; Defra, 2005, Natural England 2010). Typically, these are in the form of commercially available seed mixes which are often used to provide forage under the Government's agri-environmental schemes, Entry Level Stewardship (ELS) and Higher Level Stewardship (HLS). Potentially one of the most valuable interventions under these schemes is the provision of 'nectar flower mixture' (options EF4 and HF4). According to Natural England, the total area currently covered by these options is 3,523 hectares. Consequently, these options are potentially significant in terms of the forage they provide for invertebrates. The flowering species in such mixes typically provide a wide range of forage opportunities.

In order to gain the maximum return for the colony, a worker bumblebee should attempt to forage in the most efficient manner possible. One way of achieving this is to minimise the time spent travelling between florets and flowerheads, thus maximising the time spent collecting food for the colony and reducing the energy

expended in doing so. Any measurement of the effectiveness of foraging strategies could be described as quantifying a bee's 'foraging efficiency'.

Previous studies of bumblebee foraging can be divided into three broad categories. Firstly, the selection of forage patches (Hobbs, 1962; Heinrich, 1979a; Bar-Shai *et al.*, 2004; Makino & Sakai, 2004), secondly, levels of nectar reward (Kato, 1988; Biernaskie & Cartar, 2004) and thirdly, learning in bees (Smithson & Mcnair, 1996; Blarer, Keasar & Shmida, 2002; Dyer & Chittka, 2004). Broadly speaking, these studies have concluded that bumblebees make choices between forage patches, are capable of discrimination between flower types and have a limited capacity to learn how to handle complex inflorescences and which plant species and patches are most profitable in terms of net energy gains.

Aristotle noted flower constancy in honeybees (Grant, 1950) and Darwin (1876) also observed the phenomenon. Waser (1986) provides a useful summary of research on the subject to that point. A more recent review (Chittka, Thompson & Waser, 1999) identified various theories propounded to explain constancy including limitations in short-term memory, the need to learn how to handle different types of flower structure and intra-specific resource partitioning. The physiological influences on flower recognition by bees are considered by Chittka and Raine (2006) and include spatial resolution, colour vision and flower odour. Whilst Heinrich (1979b) concluded that the problem for a foraging bumblebee was the ability to assess the available resources, recent research (Gegear & Thomson, 2004) has suggested that changes in reward do not necessarily affect constancy.

This study examined whether flower constancy affects the 'efficiency' of nectar collection and whether such efficiency is affected by whether flowers are in a homogeneous plot or a mixed plot. It was postulated that high levels of flower constancy in the mixed plot would have an adverse effect on the efficiency of nectar collection as workers of *B. lapidarius* would be compelled to travel between relatively distant flowerheads, thereby increasing the amount of 'wasted' time and reducing the return for the colony.

The objectives of the study were to:

i. establish the efficiency of nectar collection on *Centaurea cyanus* in a homogeneous plot and in a mixed plot.
ii. identify the level of flower constancy to *C. cyanus* in the mixed plot.

Methods

The study focused on two plots of flowers, a homogeneous control plot of cornflower *C. cyanus*, and a mixed plot (which included *C. cyanus*). Space allocation was such that only two plots could be secured. The mixed plot was sown at a rate of 2g/m^2 with Emorsgate EC1 Standard Cornfield Mix containing corncockle, corn marigold, corn chamomile, common poppy and cornflower (Table 1). The two plots were approximately 1km apart, at elevations of 32m and 35m asl, respectively. The homogeneous control plot measured 312m^2 and the mixed plot 289m^2. Both plots were roughly rectangular and located on or close to the Writtle College estate, some three km west of Chelmsford in central Essex. The surrounding countryside consists primarily of low-lying agricultural land, with a mix of arable, pasture and grassland present. The survey sites themselves have been under agricultural management for many decades.

Measurement of nectar collection efficiency in both plots was undertaken by means of a stopwatch method (Heinrich 1973; Prys-Jones & Corbet, 1991) to

Table 1. Content of Emorsgate EC1 Standard Cornfield Mix

Species	% composition
Corncockle *Agrostemma githago*	35
Cornflower *Centaurea cyanus*	25
Corn Marigold *Chrysanthemum segetum*	20
Corn Chamomile *Anthemis arvensis*	10
Common Poppy *Papaver rhoeas*	10

(Note: the composition of this mix is currently slightly different to that shown above.)

establish what proportion of total time in each plot was spent on flowerheads ingesting nectar (and hence what proportion was 'wasted' travelling between flowerheads). This proportion was expressed as a percentage for each plot. A total of 80 individual workers of *B. lapidarius* was monitored in each plot with 20 individuals observed on each of four dates. (The 80 individuals monitored in the mixed plot included the 40 individuals used to measure flower constancy). Individual insects were not marked as this may have influenced behaviour or resulted in the insect abandoning the plot. Activity was recorded until the individual left the plot or could no longer be identified with certainty.

Flower constancy on *C. cyanus* in the mixed plot was measured as follows. Once an individual bee had begun to forage on *C. cyanus*, the number of successive visits to this species was counted. The total number of flowers visited was also recorded, thereby allowing constancy to *C. cyanus* to be measured as a percentage of total visits to all flower species. A total of 40 individuals was observed over four dates and, as above, activity was recorded until the individual left the plot or could no longer be identified with certainty. By definition, a constancy rate of 100% occurred on the homogeneous control plot.

All data collection started between 09.00h and 11.00h on dates during June and July 2005. The study focused on the worker caste only. Individual bumblebees were selected randomly. Nectar secretion rates and sugar content were not measured and the overall energy budget was not determined. Other insect species, including Hymenoptera, were observed collecting nectar from the other flower species in the mixed plot and it was inferred that all species were providing nectar at the time of the study.

Results

In the homogeneous control plot of *C. cyanus*, nectar collection efficiency of workers of *B. lapidarius* was remarkably consistent over the four dates in June and July, ranging from 84.5–87.0% (mean 85.9%, n = 80) (Table 2). This reasonably high level of nectar collection efficiency in the control plot meant that only 14% of the total foraging time was not spent directly ingesting nectar, the main purpose of the foraging trips.

Nectar collection efficiency of *B. lapidarius* was lower in the mixed plot (mean 78.5%, n = 80) and was also more variable ranging from 75.6–84.6% on the four sampling dates. Thus in relative terms, nectar collection efficiency was 8.6% lower in the mixed than the control plot. This indicated that available time and energy was being used more efficiently by workers in the homogeneous control plot. In the

mixed plot, more than one fifth of the available time was spent travelling between florets/flowerheads thereby reducing the efficiency of each foraging trip.

The level of flower constancy to *C. cyanus* by *B. lapidarius* in the mixed plot was 100% on all four dates despite the presence of four other nectar-producing flower species (Table 3). In total, *B. lapidarius* workers made over 700 successive visits to *C. cyanus* (Table 3). It should be borne in mind that *C. cyanus* represented only 25% of the plants present yet workers of *B. lapidarius* monitored in this study ignored all other flower species preferring *C. cyanus*.

Discussion

The main aim was to study whether flower constancy in *B. lapidarius* affected the efficiency of nectar collection by this species. Since the levels of flower constancy in both control and mixed plots were identical, at a maximum 100%, the effects of varying levels of constancy could not be investigated per se. This extremely high (complete) level of constancy was not expected. Even so, this high level of constancy to *C. cyanus* and complete lack of attraction to the other nectar-producing flower species in the test plot did affect the outcome of the efficiency of nectar collection in the mixed plot. The efficiency of nectar collection in the mixed plot was approximately 9% lower relative to the control simply as a direct result of bumblebee workers having to spend more time travelling between individual flowerheads of *C. cyanus*. It can be inferred that foraging in the mixed plot required greater expenditure of energy per unit of nectar gathered. It seems likely that efficiency in the mixed plot could have been at least maintained and possibly improved if the bumblebees had foraged on the other species present, yet they apparently chose not to do so.

There are a number of possible explanations for the avoidance of the other four flower species in the mixed plot. It appears that despite the apparent attractiveness of these species as food sources to a wide variety of insects, the nectar rewards for *B lapidarius* were less than adequate. This, however, does not entirely explain why a few workers did not experiment and visit these other flowers as potentially better sources of nectar (but see overstrike explanation below).

One physiological explanation is the tongue length of each individual bumblebee. Progressively larger workers are produced over the lifetime of the colony (O'Toole, 2002) and intra-specific variation in tongue length may occur as a result. Consequently, workers of different generations yet of the same caste and species may be adapted to differing depths of flower corolla and those individuals present on *C. cyanus* may have been left with no alternative but to continue foraging on a single species. Tongue length of bees foraging in the experimental plots, however, was not investigated. It is also likely that the bees came from more than one colony. This explanation may only be a partial one at best, as it would be wise from the bumblebee's perspective to produce workers at any one time with a reasonable range of tongue lengths in order to exploit as many flower species present in the surrounding countryside as possible.

Other potential explanations for flower constancy relate to the manner in which bumblebees process information about their environment. Recent research appears to confirm 'overstrike' of the short term memory (Ishii, 2005) whereby information about the flower species most recently visited overwrites any other information held in the short-term memory, thus rendering an individual bumblebee unable to locate and/or handle another flower species, at least for a relatively short period. An inability of bumblebees to search for combinations of floral traits is supported by

Table 2. Nectar collection efficiency of *Bombus lapidarius* in a homogeneous control plot (n = 80) and a mixed plot (n = 80) at Writtle, Essex, 2005

Homogeneous control Plot (*C. cyanus* only)		Mixed Plot	
Date	% Nectar collection efficiency	Date	% Nectar collection efficiency
25 July 2005	86.0	22 June 2005	77.1
26 July 2005	87.0	4 July 2005	75.6
29 July 2005	86.2	12 July 2005	84.6
30 July 2005	84.5	18 July 2005	77.8
Mean	85.9	Mean	78.5

Table 3. Flower constancy of workers of *Bombus lapidarius* (n = 40) to *C. cyanus* in a mixed plot at Writtle, Essex 2005

Date	Potential no. of successive visits to *C. cyanus* by *B. lapidarius* (i.e. excluding the first visit)	Actual no. of successive visits to *C. cyanus* by *B. lapidarius*	Flower constancy (%)
22 June 2005	181	181	100
4 July 2005	178	178	100
12 July 2005	178	178	100
18 July 2005	217	217	100
Total	754	754	100

Gegear & Laverty (2005) and these theories may also explain the flower constancy observed.

Commercial pollen and nectar mixes have to cater for a range of insect species and ideally provide season-long nectar availability, either through the choice of plant species themselves or by regular cutting which stimulates late season flowering. Individual bumblebees are thus likely to encounter mixed plots in the farmed landscape and to forage at suboptimal levels, as observed in this study. It is suggested that whilst individual nectar collection efficiency is desirable, colonies may accept a degree of inefficiency as a trade-off against the ability of the colony as a whole to exploit forage opportunities in the wider landscape.

In view of the limited number of plots studied, the results of this investigation can only be considered as preliminary. Further investigations could examine the effects of site location and plot size as well repeating this method for different species of flower.

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ARGYNNIS CYBELE (LEPIDOPTERA: NYMPHALIDAE) – A 'NEW' RECORD FOR THE BRITISH ISLES

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ABSTRACT

Records indicate that a specimen of the American butterfly *Argynnis aphrodite* (Fabr.) was caught in the UK in 1833. However, the actual pinned specimen has recently been confirmed as being the similar-looking *Argynnis cybele* (Fabr.). This is also an American species that has not previously been recorded in the British Isles.

INTRODUCTION

According to the published record, only a single adventive specimen of the Venus Fritillary, *Argynnis* (*Papilio*) *aphrodite* (Fabr.), has ever been caught in the UK (Emmet & Heath, 1989). Ostensibly an American species, this butterfly was captured on the wing in Warwickshire in 1833, although its presence on this side of the Atlantic has always been considered to have been due to an accidental introduction. However, a closer inspection of the actual specimen has now indicated that the butterfly was misidentified and it is in fact *Argynnis cybele* (Fabr.), commonly known as the Great Spangled Fritillary (Plate 9, Figs. 1 & 2). This American species has itself never been recorded in the British Isles.

It is worth noting that in a taxonomic revision of the larger fritillaries proposed by Simonsen (2006), the genera *Argynnis*, *Argyreus*, *Nephargynnis*, *Frabriciana*, *Mesoacidalia* and *Speyeria* are all considered to be of one genus, namely *Argynnis*, and this nomenclature has been adopted here.

HISTORY OF THE SPECIMEN

The butterfly in question was collected during the summer of 1833 by a 19-year-old amateur entomologist, James Moreton Walhouse, who had gone to Ufton Wood near Leamington, Warwickshire, in search of the Silver-washed Fritillary *Argynnis paphia* (L.). Although he was aware that one of the specimens he caught appeared different from others, through inexperience he may have assumed it to be merely a sexual morph of *A. paphia*. For a while the specimen remained unidentified and, when he subsequently left England to join the Army in India, he passed his butterfly collection to his younger brother, Moreton John Walhouse. He in turn was to give some of the butterflies, including the unusual fritillary, to his friend William Bree (1822–1917), who lived in the nearby village of Allesley, Warwickshire. William was himself a keen amateur entomologist but, more importantly, his father, the Rev. William Thomas Bree (1786–1863), vicar of All Saints' church in Allesley, was a noted observer of all aspects of natural history. Indeed, W. T. Bree contributed many articles and letters on his detailed observations of local plants, insects and bird life to the scientific journals of the time. Because of his interests, the Bree family library would have included an extensive collection of natural history books and William's father must have immediately recognised that the specimen was not a native species of fritillary.

In 1840, W.T. Bree announced through the pages of Loudon's *Magazine of Natural History* that the unusual butterfly was *Argynnis aphrodite* (Fabr.), also known as the Venus or Aphrodite Fritillary, a species that had only previously been known to occur in North America (Bree, 1840). In his paper, which included a coloured illustration of the insect, Bree went to great length to explain the nature of its capture and how he was sure that it was a genuine specimen, having come from 'gentlemen of the highest respectability', who were personal friends of his son, and that it had not been through the hands of unscrupulous dealers. Moreton J. Walhouse had also confirmed that he had seen and discussed the unusual butterfly with his brother when it was still fresh and unset and that, at the time, they had no butterflies from overseas in their collection, with which it could have been confused.

So how did this American butterfly reach Warwickshire? In his paper Bree argued that it was unlikely that it had flown or been blown across the Atlantic, so the most logical explanation was that it had been introduced accidentally, possibly in the larval state, on bedding straw brought from America.

W. T. Bree was evidently a regular correspondent with the great Oxford entomologist, J. O. Westwood. The latter's book, *British butterflies and their transformations* (Humphreys & Westwood, 1841), subsequently cited information provided by Bree regarding the distribution of many species of butterfly in Warwickshire. In response to the recently-published article by Bree, Westwood also included in his book a brief description and illustrations of the Venus Fritillary, although the illustrations provided may well have been made directly from American specimens of *A. aphrodite* in the collections of the British Museum, and not from Bree's own specimen. Westwood was also to conclude that the accidental importation of a larva was the most likely reason for the occurrence of this non-native species in Warwickshire, noting that the size of the Leamington specimen described by Bree was slightly smaller than those in the British Museum. He stated rather poignantly, 'There are several closely allied American species, including the present – if indeed they are not merely varieties of each other'.

William Bree (the son of W.T.), who retained the butterfly in his collection, went on to become curate of All Saints' Church in Polebrook, near Oundle in Northamptonshire (1847–62) and was briefly rector there in 1862, before succeeding his father as vicar of Allesley in 1863. During his time in Northamptonshire, his continued interest in butterflies brought him into contact with the Rev. F. O. Morris, a prolific author of natural history books during the latter part of the 19th century. Morris visited Bree at Polebrook in 1852, a fact that he mentions in his book, *History of British Butterflies* (Morris, 1857). In this he was to include a section on the Venus Fritillary, briefly describing the circumstances of its discovery and including a plate redrawn from *British butterflies and their transformations* (Humphreys & Westwood, 1841).

Although the Venus Fritillary does not appear in many later books published on British Lepidoptera, it is mentioned in some relatively-recent literature (Howarth, 1973; Emmet & Heath, 1989). The *Checklist of Lepidoptera Recorded from the British Isles* (Bradley, 2000) also assigns reference number 1604 to *aphrodite*, based on the single specimen from Warwickshire.

Re-identification of the specimen

Remarkably, the butterfly collection of William Bree still survives and it was amongst this that the long-lost specimen of the 'Venus Fritillary' came to light in 2006 (Plate 9, Figs 1 & 2). It is in remarkably good condition for a specimen that is

over 175 years old and that has probably been picked up and inspected on many occasions. More recently, photographs of the specimen were posted on the UK Butterflies website (*www.ukbutterflies.co.uk*). Peter Eeles, who runs this website, was contacted in April 2010 by David Ferguson of the Rio Grande Botanic Garden, based in Albuquerque, New Mexico, USA. He observed that the figured specimen was not *Argynnis aphrodite* (Fabr.), but a typical male of the nominate subspecies of *Speyeria cybele* (Fabr.) now referred to as *Argynnis cybele* (Fabr.). The two species are very similar but can be distinguished by the width of a light submarginal band on the underside of the hindwing.

The identification of the specimen as *A. cybele* was subsequently confirmed by other notable experts based in the USA, specifically Paul Opler, Jonathan Pelham and Norbert Kondla. Jonathan Pelham noted that *A. cybele* enters diapause as an unfed, first instar larva, which might explain how it could have survived a sea journey across the Atlantic, possibly amongst bedding straw. The same identification of the specimen was subsequently confirmed by Thomas Simonsen of the Natural History Museum, London, and Andrew Warren of the McGuire Center for Lepidoptera and Biodiversity, Florida.

Clearly, the original misidentification rests with Bree, although he is perhaps to be forgiven with regard to the information that would have been readily available to him at the time. Since subsequent illustrations of the butterfly (e.g. Humphreys & Westwood, 1841) seem to have been based on actual specimens of *A. aphrodite* in the British Museum, the mistake would not have been spotted by even the most critical of observers.

Conclusion

Although not strictly a 'new' record, the purpose of this article has been to correct a misidentification that occurred over 170 years ago. This correction effectively replaces one species on the British list, represented by a unique adventive specimen, with another species. That is, it replaces *Argynnis aphrodite* with *Argynnis cybele*.

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THE THIRD MODERN BRITISH RECORD OF *BRACHYMERIA TIBIALIS* (HYMENOPTERA: CHALCIDIDAE), REARED FROM *ZYGAENA FILIPENDULAE*(LEPIDOPTERA: ZYGAENIDAE)

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We wish to place on record the rearing of a single female specimen of *Brachymeria tibialis* (Walker) on 13 July 2009 from a cocoon of *Zygaena filipendulae* (L.) collected on 5 June 2009 by one of us (RC) at Denbies Landbarn, Surrey, TQ 135499, a National Trust chalk downland site. This is the third recent specimen of this large and conspicuous chalcidoid noted in southern England (Jones, 2008; Beavis, 2009), and the first British rearing record. The specimen was determined by MRS and is deposited in the National Museums of Scotland.

Askew & Shaw (2001) give morphological grounds for suspecting that two sibling species might be confused under the name *B. tibialis* in the Western Palaearctic, one associated with *Zygaena* species and the other more generalised. The presence of an evidently well-distributed British population provides entomologists living in southern England with a good opportunity to investigate this possibility through experimental rearings, by exposing a suitable selection of Lepidoptera prepupae and pupae to adult females reared from *Zygaena* species.

We are indebted to the National Trust for permission to collect these insects at Denbies Landbarn and the Centre for Ecology and Hydrology Environmental Change Integrating Fund for support.

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SHORT COMMUNICATION

Podagrica fuscicornis **(L.) (Col.: Chrysomelidae) in North Hampshire** – On 8.viii.2010, I found a single adult female of *P. fuscicornis* on the flowerhead of a field scabious *Knautia arvensis* growing on a verge amongst arable land, on chalk at Abra Barrow, south of Overton (SU5047). This appears to be the first record for VC12, and may provide further evidence of a westward expansion, and somewhat overdue, given the spate of recent records from Surrey – Jonty Denton, 25 Glebe Meadow, Overton, Hants RG25 3ER.

ONCOPSIS APPENDICULATA (HEMIPTERA: CICADELLIDAE) NEW TO BRITAIN

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Abstract

The leafhopper *Oncopsis appendiculata* W. Wagner (Cicadellidae: Macropsinae) is reported for the first time from Britain from Wallascote, Cheshire. Notes on its taxonomy, distribution and hostplants are given.

Introduction

As part of a survey of former lime settling beds and other sites throughout Cheshire, Auchenorrhyncha were recorded for the purposes of site assessment. A total of 49 species were recorded from a variety of habitats including deciduous woodlands, wetlands, grassland and brownfield vegetation which had developed on settling beds of varying ages. One of the species recorded, *Oncopsis appendiculata* W. Wagner (Cicadellidae) is an addition to the British list. The specialised habitat in which it was recorded suggests that whilst it may have been previously overlooked it is unlikely to be common in Britain.

Within the subfamily of the Macropsinae, there are currently six species of *Oncopsis* known from Britain (Le Quesne & Payne, 1981), all of which are arboreal, occurring mainly on birch (*Betula* spp.) but also on alder (*Alnus glutinosa*), hornbeam (*Carpinus betulus*) and hazel (*Corylus avellana*) (Claridge, Reynolds & Wilson, 1977). *Oncopsis avellanae* Edwards, previously regarded as a form of *O. carpini* Sahlberg by Le Quesne (1965), is now regarded as a good species (Claridge & Howse, 1968; Claridge & Reynolds, 1972; Claridge & Reynolds, 1973) and has subsequently been recorded elsewhere in Europe (Claridge & Reynolds, 1972; Nickel, 2003). There is some evidence to suggest that an additional species of *Oncopsis* may be present on birch in Britain which is closely related to *O. flavicollis* (L.) (Claridge & Nixon, 1986).

Nine species in the genus *Oncopsis* are recognised in Europe (Mühlethaler, 2008). These can be conveniently split into two groups based on the structure of the male genitalia – the *O. flavicollis* group (*flavicollis-subangulata-avellanae-carpini*) and the *O. alni* group (*alni-appendiculata-krios-planiscuta-tristis*). The hostplants of all European species are members of the Betulaceae, with the exception of *O. krios* Mühlethaler, which occurs on Ulmaceae (Mühlethaler, 2008).

Two species of the *O. alni* group are currently recognised as British, *O. alni* (Schrank), which occurs on alder *Alnus glutinosa*, and *O. tristis* (Zetterstedt), which is recorded from *Betula pendula* and *Betula pubescens* (Claridge, Reynolds & Wilson, 1977), and both are widely distributed in Britain (Le Quesne, 1965).

Several specimens (both males and females) of *Oncopsis* spp. were beaten from bushes and large 3–4 m high saplings of *Betula pendula* (silver birch) at Wallascote limebeds, Northwich, Cheshire (SJ634735) on 14.vi. 2008. Fortunately three of the specimens were male (Plate 9, Figs. 3 & 4) and dissection of the aedeagus and anal tube processes of two of the three males conformed with that for *O. appendiculata* from the figures in Ossiannilsson (1981) (Figs. 1 & 2) and Biedermann & Niedringhaus (2004). *Oncopsis appendiculata* has not previously been recorded from Britain. The specimens were present alongside another *Oncopsis* species, *O. flavicollis* as part of a mixed population.

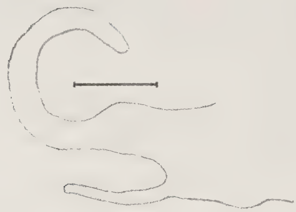

Figure 1. *O. appendiculata* male, right anal tube process, viewed from right, adapted from Ossiannilsson (1981). Scale bar = 0.1 mm.

Figure 2. *O. appendiculata* male aedeagus, lateral view from left, adapted from Ossiannilsson (1981). Scale bar = 0.1 mm.

The birch trees on which *O. appendiculata* were recorded grew sparsely on the marginal earth embankments of four former lime beds, which have most recently been used as settling lagoons for slurry from adjacent alkali works, but are now slowly re-vegetating and have developed a sparse secondary woodland comprising *Betula pendula*, *Crataegus monogyna* (hawthorn), *Salix cinerea* ssp. *oleifolia* (rusty willow) and *Sambucus nigra* (elder). Elsewhere on the site sporadic bushes and saplings of *Salix caprea* (goat willow), *Fraxinus excelsior* (ash) and *Salix* × *reichardtii* (hybrid grey-willow) were also present, and over the majority of the site the field-layer is virtually bare although sporadic patches of ruderal vegetation have developed in some areas including characteristic calcareous species such as *Reseda lutea* (wild migonette), *Blackstonia perfoliata* (yellow-wort) and other species typical of dry grassland such as *Hypericum perforatum* (perforate St John's-wort) and *Centaurium erythraea* (common centaury). The limebeds are raised some 10 m above the surrounding landscape and as such are comparatively isolated and exhibit a diversity of calcareous flora not found in adjacent habitats.

Oncopsis appendiculata is a species with a restricted distribution in central and northern Europe: it is rare in Sweden, and occurs in Austria, France, Germany, Netherlands, Poland and Latvia (Ossiannilsson, 1981) and has recently been recorded from northern Spain (M. Wilson, 2008, *pers.comm.*).

Notes and revised key for identification

Oncopsis appendiculata males are easily distinguished from all other British *Oncopsis* by the extraordinary form of the anal tube processes (Fig. 1). The reduction in facial markings (Plate 9, Fig. 5) and comparatively small size are useful field characters to separate potential *O. appendiculata* from other species in order to facilitate critical determination of preserved specimens. *Oncopsis appendiculata* most closely resembles *O. tristis* but is larger.

Revised key couplets for British *Oncopsis*

Adapted from Le Quesne (1965) & Mühlethaler (2008)

Males

1 Length of forewing 3.4–3.6 mm; a more or less rounded brown spot on forewing m–cu cross-vein. Anal tube processes with two unequal inwardly curving branches. Aedeagus concave in profile. Overall length 3.9–4.4 mm
. . . . **tristis** (Zetterstedt)

1a Length of forewing greater than 3.6 mm; a faint rounded brown spot on forewing m-cu cross-vein (Plate 9, Figs 3 & 4). Anal tube processes with two unequal branches with the longer branch curving distinctly outwards (Fig. 1). Aedeagus convex in profile (Fig. 2). Overall length 4.1–4.7mm
.... **appendiculata** Wagner
1b Length of forewing greater than 3.6mm; forewing m–cu cross-vein normally narrowly or not at all bordered darker 2

FEMALES
1 Length of ovipositor visible in ventral aspect less than 1.3 mm. Length of forewing 3.3–3.7mm. Caudal margin of seventh abdominal sternum convex, with a shallow incision. Overall length 3.8–4.3mm
.... **tristis** (Zetterstedt)
1a Length of ovipositor visible in ventral aspect greater than 1.3 mm. Length of forewing not less than 3.9 mm. Caudal margin of seventh abdominal segment convex with a shallow incision. Overall length 4.5–4.7 mm
.... **appendiculata** Wagner
1b Length of ovipositor visible in ventral aspect greater than 1.3mm. Length of forewing not less than 3.9mm. Caudal margin of seventh abdominal segment almost straight or concave. Overall length not less than 4.8 mm. 2

HOST PLANTS AND BIOLOGY

In Sweden *O. appendiculata* is associated solely with *Betula pendula* (= *verrucosa*) (Ossiannilsson, 1981) but in Germany it occurs on *B. pendula* (Biedermann & Niedringhaus, 2004) and rarely on *B. pubescens* (Nickel, 2003), suggesting that in the south of its range it could feed on additional species of Betulaceae.

Ossiannilsson (1981) notes that in Sweden *O. appendiculata* is confined to *B. pendula* on sun-exposed sites and is highly thermophilous, and this would appear to be the case for populations of *O. appendiculata* in the northern parts of its range, as in Britain it occurs in brownfield habitat, a habitat which characteristically supports a range of uncommon range-restricted thermophilous invertebrates (e.g. Gibson, 1998).

Although stands of *B. pendula* are by no means uncommon on brownfield sites in Britain, the localised occurrence of *O. appendiculata* in the northern parts of its range suggest that few of them will harbour additional populations in Britain.

Nickel (2003) comments that *O. appendiculata* often occurs with other species of *Oncopsis* and this would appear to be true also for the British population, as the population at Wallascote occurs with *O. flavicollis*. It is possible that additional colonies in Britain may have been overlooked but the unusual nature of the British site suggests that colonies are likely to be uncommon.

A male and female specimen have been deposited in the British Hemiptera collection, the Natural History Museum, London.

ACKNOWLEDGEMENTS

Thanks to Mick Webb at the Natural History Museum (NHM), London for confirming my identification, useful discussion and commenting on an earlier draft of this paper. Thanks also to Laurence Livermore at the NHM for taking photographs of the specimens. Thanks to Richard Carter (RSK Carter Ecological) for confirming the identity of the *Betula* sp. at Wallascote and providing details of other tree and plant species present and to Cheshire County Council for funding the survey as part of the REVIVE project. Thanks to Mike Claridge for generously supplying copies of his *Oncopsis* papers. Please note there is no public access to the site.

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REVIEW

British and Irish butterflies App by Adrian Riley. iTunes app version, 2010. £4.99. Available via http://itunes.apple.com/gb/app/british-irish-butterflies/id376331398?mt=8#.

If you are an entomologist and appen to own a modern mobile phone then the latest app from Brambleby Books is a must for you. The app is entitled "British and Irish Butterflies" and is an abridgement of the book of the same name by Adrian Riley. Its most important feature is a set of easily accessible photographs and descriptions of 108 taxa depicting 59 species including all known UK subspecies and forms. There are helpful field tips on when and where to locate species including OS grid references. Drilling down further, for each species there is information on general distribution, flight period, larval food plants, habitat requirement and key identification characters. Great care has been taken to show the user how to separate closely related species for example with close-up photographs of wing markings of the various blues.

The use of new common names for local races of butterfly may take a bit of time getting used to: for example, Irish brimstone *Gonepteryx rhamni* ssp. *gravesi* Huggins; Isles of Scilly speckled wood, *Pararge aegeria* ssp. *insula* Howarth; Burren grayling *Hipparchia semele* ssp. *clarensis* de Lattin, or Atlantic grayling *H. semele* ssp. *atlantica* (Harrison).

This app should help entomologists confirm the identity of insects we rarely encounter in the field nowadays such as the fritillaries. I certainly found the information very useful when locating a critically endangered population of small pearl-bordered fritillary *Boloria selene selene* (D. & S.) at Lannacombe Bay, Devon earlier this year.

John Badmin

2009 ANNUAL EXHIBITION

Imperial College, London SW7 – 7 November 2009

The following accounts of the exhibits were compiled by A. M. Jones (British Butterflies), S. P. Clancy (British Macrolepidoptera), R. J. Dickson (British Microlepidoptera), N. M. Hall (Foreign Lepidoptera), P. J. Chandler (Diptera), P. J. Hodge (Coleoptera), A. J. A. Stewart (Hemiptera), J. S. Badmin (Hymenoptera, other Orders and General). Compilers always have an onerous task when preparing the reports and it would be a great help to them if exhibitors could include email addresses with their exhibit reports so that long accounts can be transferred electronically. For the second year in succession Joseph Botting kindly acted as exhibition photographer and this year he has produced three plates covering butterflies, macro- and micro-moths and other Orders. The cost of printing the plates was covered by a grant from the Hammond Memorial Fund. These may also be examined in greater detail on the Society's website (*www.benhs.org.uk*).

Approximately thirty members and their guests attended the Society's Annual Dinner which took place in the Senior Common Room at Imperial College at the rear of the exhibition hall. This takes place as soon as the exhibition closes and the tables have been cleared and tidied away and members can relax and chat over a drink or two before the meal. This year the dinner was most enjoyable, indeed all courses, and the university's catering staff deserve our thanks for a memorable evening. Exhibition day is one of the very few occasions during the year when members of the Society from all parts of the UK meet and socialise. Thus it is an ideal occasion to stay on for a few more hours, relax, listen to the erudite words of the President, chat a little more with your colleagues and make some new acquaintances. In 2010 it is intended to hold the annual dinner at the nearby Strathmore Hotel, a couple of hundred metres away from the Royal Entomological Society's former premises in Queen's Gate. With more room and a more relaxing atmosphere it is hoped that more members will come along. You could even stay overnight at the hotel at a special entomologist's rate.

Mike Simmons, Exhibition Secretary, deserves our special thanks for ensuring that the 2009 Annual Exhibition day ran extremely smoothly without any apparent technical hitches. Photographs of members and guests who attended during the day and at the annual dinner are interspersed throughout the report (Figs 1–6).

Butterflies

Bailey, K. E. J. – Results of breeding experiments during 2009 in two parts.

Part 1 comprising *Argynnis paphia* (L.), extreme melanic aberrations up to ab. *nigricans* Cosmovici and f. *valesina* Esper ab. *nigrizina* Frohawk from cold-shocked pupae. Some females from this inbred stock appeared intermediate to f. *valesina*. A melanic female of *Argynnis aglaja* (L.) from heat-shocked pupa ex Devonshire stock. *Boloria euphrosyne* (L.), a partially melanic aberration from heat-shocked pupa ex Gloucestershire stock. *Melitaea athalia* (Rott.) ab. *corythalia* Hübn. from cold-shocked pupa, inbred stock. *Boloria selene* (D.&S.), a variable series of aberrations similar to ab. *vanescens* Cabeau resulting from heat and then cold-shocked pupae. Also two melanic aberrations that appeared after late heat shock, all ex Devonshire stock. *Limenitis camilla* (L.) ab. *nigrina* Weymer from cold-shocked second brood pupae.

Part 2. The exhibitor had learned from a medical authority that pure oxygen when delivered to premature babies inhibits the normal development of the retina causing neonatal blindness. The exhibitor wondered what effect this might have on insect tissue and in particular the differentiating wing pattern in young pupae. Suitable equipment was conceived and a supply of pure oxygen obtained. It was decided to raise the oxygen percentage in the atmosphere surrounding the pupae during the first 24 hours after temperature shocks at the appropriate times, already known through long experience.

The results were dramatic. It was observed that: (a) the susceptibility to form non-differentiation type aberrations was increased. (b) the frequency of such aberrations was raised and there were more extreme examples seen. (c) there was greater toleration of more extreme temperature shocks. (d) several 'new' types of aberration were observed.

Examples from this new line of investigation included, *Argynnis paphia* ab. *nigrizina* a very extreme example from cold-shocked pupa. *Aglais urticae* (L.) ab. *semiichnusoides* Pronin, these appeared in large numbers after cold then heat shocks, ab. *conjuncta* Neuberg also from cold and then heat shock, un-named melanic forms from prolonged cold shock then heat shock and an aberration approaching ab. *osborni* Donckier (Plate 10, Fig. 5), also from prolonged cold shock then heat shock. *Cynthia cardui* (L.) an unusual form of ab. *rogeri* Meilhan (Plate 10, Fig. 8) and a most extreme example of ab. *elymi* Rambur, from heat shock to pupae. Aberrations of *Issoria lathonia* (L.) of this normally resistant species derived from heat and cold shocked pupae, all ex inbred French stock.

CLARKE, J. – *Neozephyrus quercus* (L.) ab. *infraobscura* Goodson, (Plate 10, Fig. 3), two specimens bred ex Dorset larvae, 2009.

GEORGE, A. M. – *Maniola jurtina* (L.), a male with pale bleached hind wings, taken near Cocklake, Somerset, 30.vi.2009.

JONES, A. M. – Breeding experiments during 2008 and 2009. *Argynnis paphia* (L.) ab. *teresa* Agenjo. A female ab. *teresa* (blue tinting replacing the normal green) was taken in July 2008 and an F_1 generation was reared in 2009 comprising 106 butterflies, 52 males (27 bluish) and 54 females (35 bluish) – a total of 62 or 58% with a variable bluish tint. This would indicate a dominant gene, however more extensive breeding would be necessary to determine this. Unfortunately an F_2 generation was not achieved with this stock, but breeding is being attempted with similar females.

Argynnis paphia, extreme homoeosis. A female showing extreme homoeosis to the underside forewings (Plate 10, Fig. 4), reared from a wild homoeotic female captured July 2008. This was in a very small brood of eight butterflies comprising three males (1 homoeotic) and five females (2 homoeotic), 37.5%. This type of homoeosis in *paphia* seems to be heritable, but variable in its expression, it is interesting that in the exhibitor's experience the more extreme specimens seem to occur in small broods. Two other larger broods from different females reared at the same time produced minor examples. These were as follows; a brood of 68 had 29 homoeotics (42.5%) and a brood of 48 had 18 homoeotics (37.5%).

Polygonia c-album (L.) ab. *o-album* Tutt. An F_1 bred specimen from a type female taken in April 2009. The brood of 118 butterflies comprising 70 type, 32 ab. *g-album* Tutt and 13 ab. *o-album*, so a total of 45 aberrations, 38%. Aberration *g-album* and *o-album* seem to be closely linked with one being a more extreme expression of the other.

Aricia agestis (D. & S.) ab. *pallidior* Oberthur. A female ab. *pallidior* was taken in August 2008 and a typical F_1 brood was reared at the end of September. From these, pairings gave an F_2 in November of 60 butterflies with 15 (25%) ab. *pallidior*.

Interestingly only two of the *pallidior* were males, but the overall percentage was normal for this recessive gene.

Lycaena phlaeas L. ab. *radiata* Tutt. A female ab. *radiata* was taken in September 2008, the resulting larvae would not stop feeding and an F_1 generation finally emerged November/December 2008. These comprised 40 individuals of which 50% were *radiata*. This is a known recessive, so it is assumed that the original female had paired with a typical male that was a heterozygous carrier of the *radiata* gene.

KNILL-JONES, S. – *Melitaea cinxia* (L.), a specimen with pale patches on the forewings with a typical example, both from Afton Down, Isle of Wight, 24.v.2009.

MEREDITH, S. – An interesting photographic exhibit of notable butterflies from various years. *Maculinea arion* (L.), original English butterflies from near Buckfastleigh, Devon with some habitat photographs 7.vii.1973. Also photographs from Somerset in 2008 of the introduced Swedish stock from the Island of Oland just off the South East mainland coast. The exhibitor believed the original English butterflies were possibly brighter than the Swedish stock and with a slightly larger area of black spotting on the upper side forewings.

Carterocephalus palaemon (Pallas) – the exhibitor had searched for this species without success in the East Midlands for two years during 1960s. In 1973 he heard rumours that it had been found in Rutland and was then told that the locality was South Luffenham Golf Course. The site was visited on 26.v.1974, the roughs on the northern end were explored without success, the exhibitor was about to give up when he realised there was an area he had not yet investigated and here he was successful and found eight butterflies. The locality included a small sunken lightly wooded 'island' completely surrounded by mown grass. The next day a visit with a friend in similar weather conditions only produced five butterflies. The following year after a prolonged search only one was found. 1976 was believed to be its final year. A return in recent years showed the old haunts to be either overgrown or absorbed by fairways.

Lycaena phlaeas (L.), various aberrations, the highlight being a male ab. *schmidtii* Gerhard, from Surrey 12.ix.2009 and an example tending towards ab. *cuprinus* Peyer with a paler tone to the forewings near the thorax and the hind wing band reduced to pale reddish and becoming broken into lines, ab. *radiata* Tutt, 16.ix.2007 Cheshunt Park, Herts. Also a photograph of a pair in copula, the female being ab. *caeruleopunctata* Ruhl.

Argynnis paphia (L.), photographs of aberrations from recent years, a male and female ab. *ocellata* Frings from different W. Sussex localities 1 & 4 vii.2009 and a more extreme female from Bookham Common, Surrey 8.vii.2006. Also a bilateral gynandromorph with the left side f. *valesina* Esper from Cheddar Wood, Somerset, 17.vii.2006.

Issoria lathonia (L.), photographs from the well-documented temporary colony near Chichester, West Sussex. The main site was a wide grassy field edge between the road boundary hedge and a crop of maize, though other local fields were also used. A total of eight or nine butterflies were seen including a mating pair. The food plant *Viola arvensis* Murray or *V. tricolor* L. was growing amongst the maize. Photographs were taken on 10 &12.x.2009.

Photographs of six wild pupae of *Anthocharis cardamines* (L.) found on the foodplant *Alliaria petiolata* (M. Bieb.) Cavara & Grande, of the six, one was still green, the exhibitor wondered about the benefit of this as although there was a single very thin branch stem with very green small leaves the pupa was not a good mimic.

Neozephyrus quercus (L.), photographs of two females with their wings open, taken at low level, both Surrey, vii.2002.

Colias croceus (Geoffroy), a pair in copula taken at Birling Gap, East Dean, East Sussex, the female was still limp. It was estimated that the locality contained about 300 butterflies on the day the site was visited.

Satyrium pruni (L.) from Glapthorne Cow Pasture, near Oundel, Northants.

Parker, M. – *Argynnis aglaja scotica* Watkins, ab. *suffusa* Tutt (Plate 10, Fig. 7) a heavily suffused female taken at Choc an Fhithich, Isle of Barra, Outer Hebridies, 27.vii.2009 amongst many normal individuals.

Rook, S. J. – *Pyronia tithonus* (L.) ab. *subalbida* Verity (Plate 10, Fig. 1), a female taken in Dorset vii. 2009. *Colias croceus* (Geoffroy) f. *helice* Hübner ab. *pseudomas* Cockerell bred ex ova autumn 1975.

Tebbutt, P. – Specimens taken or bred during 2008 & 2009. *Argynnis aglaja* (L.), a female ab. *pallida* Tutt (Plate 10, Fig. 6) and a male with a dark suffused forewing costal area taken on consecutive days, vii.2009. *Coenonympha tullia polydama* (Haworth), a male ab. *lanceolata* Arkyl and a dwarfed male, both rare in Scottish localities and taken from a Mid Lothian site within minutes of each other.

Argynnis paphia (L.), an extreme female ab. *nigricans* Cosmovici from cold-shocked pupa. *Melitaea athalia* (Rott.), two ab. *cymothoe* Bertolini one very extreme (Plate 10, Fig. 2), and an ab. *corythalia* Hübn. from cold-shocked pupae all from long held captive bred stock, only about 1 in 40 treated pupae produced aberrations. *Vanessa cardui* (L.), extreme examples from heat-shocked pupae including ab. *rogeri* Meilhan, with contrasting light and dark underside forms and ab. *inorata* Bramson and ab. *elymi* Rambur.

Pieris napi (L.), a series of eight gynandromorphs bred in 2008, these emerged in late May as a 'summer' brood from pairings obtained from over-wintered F_1 & F_2 stock that started to emerge naturally at the end of March. Interestingly they were bred from the same locality as some previously exhibited *Anthocharis cardamines* (L.) gynandromorphs.

Polyommatus icarus (Rott.), a short bred series of ab. *melanotoxa* Pincitore-Marott (ab. *arcuata* Weymer), only a few males emerged showing this aberration and all were poorly marked in comparison to the females. Also exhibited was a male with dark forewings the only aberration to emerge from pupae given long cool shock. *Lycaena phlaeas* (L.) ab. *addenda* Williams, ab. *remota* Tutt, ab. *oblitera* Scudder and ab. *ultraeleus* Leeds from long cooled shock to pupae. Also two hind wing aberrations from untreated pupae, one with reduced bands and one with pupilled spots.

British macrolepidoptera

Albertini, M. V. – An exhibit by the Buckinghamshire County Recorder detailing records of interest from the county during 2008 and 2009. This included specimens of *Eupithecia phoeniceata* (Ramb.) and *Lampropteryx otregiata* (Mete.), species new to the county, the former recorded from three sites in 2008 and 2009, the latter from two sites in 2009. Also mentioned as new to the county in 2008 (but not shown) were *Eilema caniola* (Hübn.), *Calophasia lunula* (Hufn.), *Cryphia algae* (Fabr.), and *Proxenus hospes* (Frey.).

County rarities shown from the previous two seasons included *Xanthorhoe biriviata* (Borkh.) from a new site at Chorleywood, 30.vi.2009; *Clostera pigra* (Hufn.), the first county record in c. 40 years from Stoke Common, 5.viii.2009; and *Xestia agathina* (Dup.), the first county record in c. 70 years from Aston Clinton Rag Pits on 8.ix.2008.

Barclay, M. V. L. – A damaged male example of *Lymantria dispar* (L.) that had been found in Fulham, London, beneath a *Platanus* × *hispanica* tree on 25.vii.2009,

Fig. 1. David Young and Rob Parker examining an insect photography exhibit. Photo: Ian McLean.

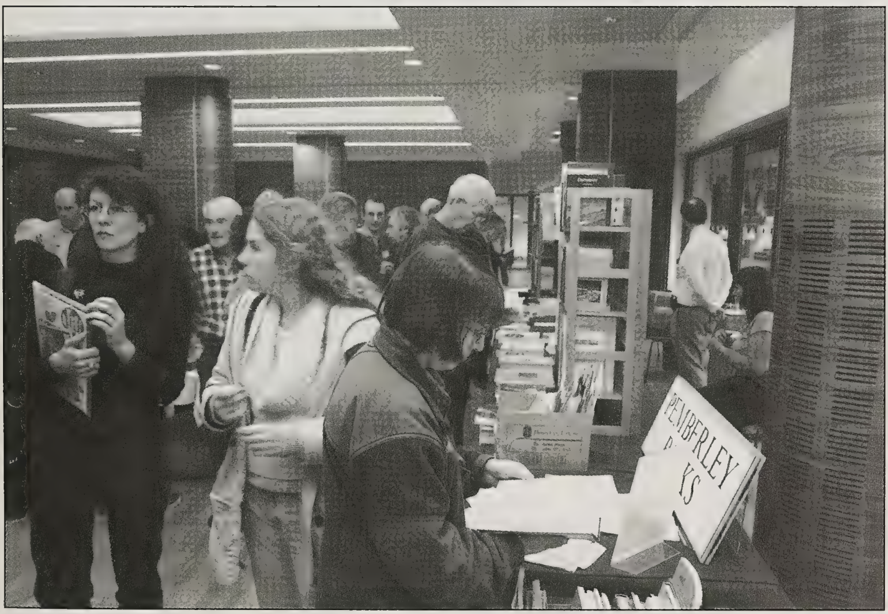

Fig. 2. Crowds at Ian Johnson's book stall. Photo: Ian McLean.

Fig. 3. John Muggleton manning the Society's stand talking to Mick Parker, with Claudia Watts, Richard Jones and Philip Jewess in background. Photo: Ian McLean.

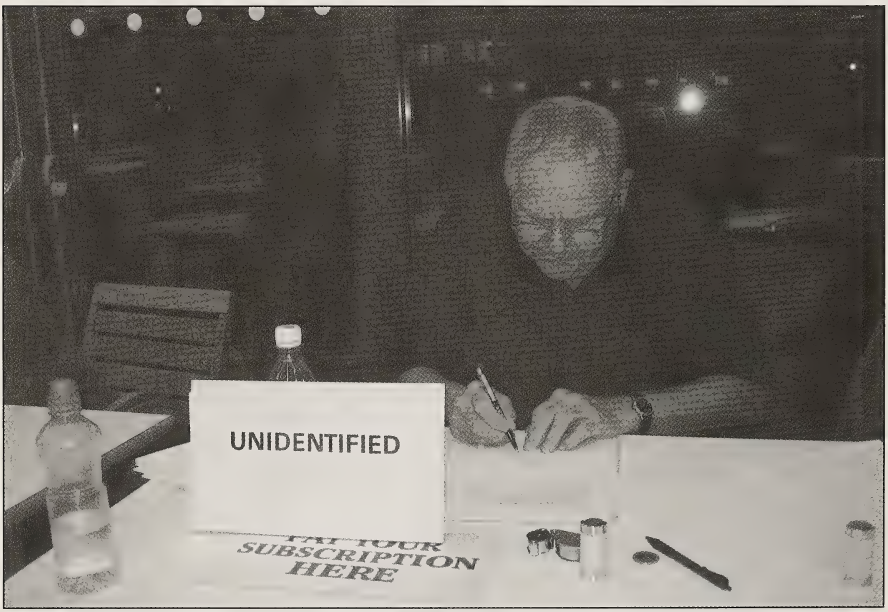

Fig. 4. Light dawns as unidentified lepidopterist discovers he is Bernard Skinner. Photo: Cathy Pickles.

with a comment that two additional males of the species were seen flying among *Platanus* × *hispanica* trees, the only available larval foodplant present at this locality.

BROWN, D. C. G. – A striking and rare aberration of *Arctia caja* (L.) with largely unmarked forewings and dusky hindwings (Plate 11, Fig. 5), taken at Enochdhu, Perthshire on 11.vii.2009. Also a female example of *Cyclophora ruficiliaria* (H.-S.) from Falmouth, Cornwall on 25.viii.2009.

BUTCHER, A. G. J. – A selection of interesting species and minor aberrations taken or reared in Kent during 2009. These included immigrant examples *Nola aerugula* (Hübn.), two specimens taken at Grain on 26.vi.; *Deltote bankiana* (Fabr.), Grain, 27.vi.; *Itame brunneata* (Thunb.), specimens from Blean on 31.v. & 12.vi., and Grain on 27.vi.; and *Scopula rubiginata* (Hufn.) from Pegwell Bay on 10.viii. Also shown were bred examples of *Macdunnoughia confusa* (Steph.) reared from a female taken at Grain on 17.ix. with a comment that a period of just one month had elapsed between the egg and adult stages.

CLARKE, J. H. – A selection of moths mainly recorded or reared in 2009 that included, from Dungeness, Kent, *Clostera anachoreta* (D. & S.) on 31.vii., and *Cryphia algae* (Fabr.) and *Amphipoea lucens* (Frey.) on 12.viii.; from Crawley Down, Sussex, *Hippotion celerio* (L.) taken on 7.x. and *Miltochrista miniata* (Forst.) ab. *flava* Bigneau taken on 14.ix.2008; from Blean, E. Kent on 27.vi. examples of *Itame brunneata* (Thunb.) (two seen), *Eupithecia plumbeolata* (Haw.), *Schrankia taenialis* (Hübn.) and *Paracolax tristalis* (Fabr.) (of about 50 seen); and bred from larvae found at Slea Head, Dingle, Co. Kerry in 2008, *Eupithecia venosata plumbea* Huggins and *Hadena caesia* (Gregs.).

COOK, R. R. – A short bred series of *Dryobotodes tenebrosa* (Esp.) (Plate 11, Fig. 4), these being the first generation progeny of the first British example of this species – a female taken by P. A. Davey at Durlston, Dorset on 12.x.2008.

DEANS, M. – Moths taken in East Suffolk in 2009 that included the following: *Drepana curvatula* (Borkh.), the first county record taken at Bawdsey on 2.viii.; *Aplasta ononaria* (Fuess.), the second county record from Bawdsey on 4.viii.; *Itame brunneata* (Thunb.), a specimen taken at Bawdsey on 9.vi., the first of three records from this site during the month; *Selenia lunularia* (Hübn.), a probable immigrant specimen from Bawdsey on 7.viii.; *Lymantria dispar* (L.) from Bawdsey on 10.viii.; *Standfussiana lucernea* (L.), the first county record from Bawdsey on 6.viii.; *Mythimna unipuncta* (Haw.) from Bawdsey, 31.x.; *Conistra erythrocephala* (D. & S.), Bawdsey, 2.xi. (the fifth county record, all from this site); and *Macdunnoughia confusa* (Steph.) from Bawdsey on 14.ix.

DOBSON, A. H. – An exhibit that included examples of *Eilema caniola* (Hübn.) from Torquay, S. Devon on 17.viii.2009 and near Basingstoke, N. Hampshire on 22.ix.2008 (captor: G. A. Henwood); also from Torquay a late record of *Miltochrista miniata* (Forst.) taken on 14.ix.2008. Exhibited from the Rothamsted trap at Starcross, S. Devon were examples of *Celaena haworthii* (Curtis) recorded in early August 2009 and a banded form of *Colostygia pectinataria* (Borkh.) recorded in late May 2008. From Winnall Moors, N. Hampshire, examples of *Graphiphora augur* (Fabr.) from 23.vi.2009 (once widespread in the county now very local and occasional in appearance), *Celaena haworthii* (Curtis) from 10.vii.2009 and *Diachrysia chryson* (Esp.) recorded at blossom on 23.vi.2009. Also shown was an example of *Trichoplusia ni* (Hübn.) taken by G. A. Henwood at Kempshott, Basingstoke, N. Hampshire on 10.viii.2009.

EVANS, D. – A single moth exhibit featuring the first British specimen of *Lomographa cararia* (Hübn.) (Plate 11, Fig. 2). This had been taken at light at Merriot, near Crewkerne, Somerset, on 1.vii.2009, and was exhibited on behalf of the captor R. Clatworthy.

GEORGE, A. M. – Two aberrations of *Spilosoma luteum* (Hufn.) taken in the exhibitor's garden in Radnage, Bucks., on 18.vi.2004 and 13.vii.2009. Also shown was a photograph of *Xanthorhoe biriviata* (Borkh.) taken in c.1955 by W. E. Minnion, one of the original discoverers of this species in Britain.

HALL, N. M. – From Berkshire a number of species of interest for the county that included *Eupithecia phoeniceata* (Ramb.) from Earley, 7.ix.2009; *Elaphria venustula* (Hübn.) from Padworth Common, 29.vi.2009; and *Heliothis peltigera* (D. & S.) from Maidenhead, 9.viii.2009 (captor: L. J. Finch). Also minor aberrations of *Xanthorhoe spadicearia* (D. & S.) and *Abrostola tripartita* (Hufn.), and specimens of *Idaea straminata* (Borkh.) showing the specialised hindlegs of the male.

Several species recorded during visits to Hastings Country Park, Sussex in 2009 were shown including *Xanthia gilvago* (D. & S.) from 25.ix. Examples of *Cosmia affinis* (L.) and *Cosmia pyralina* (D. & S.) were exhibited to show variation and the potential shortfalls in the published separation criteria of these two congeners. Also shown for comparison and discussion were examples of *Eilema depressa* (Esp.), *Eilema griseola* (Hübn.) ab. *stramineola* Doubl., and *Eilema sororcula* (Hufn.).

HARMAN, T. – A wonderful exhibit featuring a wide range of historic examples of rare aberrations, scarce migrants and extinct species. Any of the aberrations shown would have graced the exhibition plate had they been contemporary in origin and these included *Catocala nupta* (L.) ab. *brunnescens* Warr. from Essex in 1918 (leg. A. R. Ness); extreme aberrations of *Callimorpha dominula* (L.), *Arctia caja* (L.), *Abraxas sylvata* (Scop.), *A. grossulariata* (L.) and *Spilosoma luteum* (Hufn.); and *Polia nebulosa* (Hufn.) ab. *thompsoni* Arkle, an example of this striking, probably extinct, form, from Delamere Forest, Cheshire in 1908. Extinct species shown included historic British specimens of *Eremobina pabulatricula* (Brahm), *Cucullia gnaphalii occidentalis* Boursin, *Laelia coenosa* (Hübn.), *Isturgia limbaria* (Fabr.) and *Fagivorina arenaria* (Hufn.).

HARVEY, M. C. – An exhibit by the Berkshire County Recorder detailing records of two new species to the county in 2009: *Itame brunneata* (Thunb.), a photograph of the first county example from Dry Sandford Pit, 31.v. (Reading & District NHS), and a specimen taken in Wokingham, 31.v. (captor: E. Napper), with three further county records in June (see also I. D. Masters exhibit); *Calophasia lunula* (Hufn.), the first county specimen taken in Maidenhead on 30.iv. by L. J. Finch.

Also an illustrated exhibit describing the circumstances surrounding the discovery of the first British record of the zygaenid moth *Pryeria sinica* (Moore). The adult moth was found inside a house at Upper Bucklebury, Berkshire on 6.x.2009, presumably the result of accidental importation.

HAYWARD, R. – A range of species recorded from the exhibitor's garden in Wokingham, Berkshire since 2006 and representing new 10km square records, though the most interesting of these had been exhibited at previous annual exhibitions. An example of *Xestia agathina* (Dup.) from this site on 2.ix.2009 was the most interesting record from the previous season.

A number of minor aberrations were also shown from Wokingham that included the striking ab. *ramosana* form of *Nycteola revayana* (Scop.) taken on 8.viii.2009, and a melanic example of *Dryobotodes eremita* (Fabr.) taken on 16.ix.2009. Among a number of unseasonable records detailed were specimens of *Idaea trigeminata* (Haw.) on 25.x.2009 and *Orthosia cerasi* (Fabr.) on 20.xii.2008.

Species exhibited from outside Berkshire included *Malacosoma castrensis* (L.) reared from larvae found on the Isle of Sheppey, Kent in vi.2009, and a specimen of *Mesoleuca albicillata* (L.) from Gussett's Wood, Buckinghamshire on 26.vi.2009.

HENWOOD, B. P. – A specimen of *Eupithecia virgaureata* (Doubl.) bred from a first brood larva found on pignut *Conopodium majus* on 19.vi.2009 at Fingle Bridge, S. Devon. A photograph of the larva was also shown.

JENKINS, A. – A variable, bred series of *Angerona prunaria* (L.) bred from a female taken at East Blean, E. Kent in 2007; *Chloroclysta miata* (L.) bred from a female taken in Perthshire in 2009; and an example of *Orthosia populeti* (Fabr.) taken in Aviemore, Inv. in 2009. Also shown were minor aberrations of *Trichopteryx carpinata* (Borkh.) (ab. *fasciata* Prout with fused cross-lines) and a strongly banded form of *Chloroclysta siterata* (Hufn.).

KOLAJ, A. – Variable series of *Agrotis exclamationis* (L.) and *Omphaloscelis lunosa* (Haw.) taken in the exhibitor's garden near Coventry, Warwickshire. Also shown were a series of *Orthosia gracilis* (D. & S.) and *Cleora cinctaria* (D. & S.) *bowesi* Rich. from Struan, Perthshire, iv.2009; *Endromis versicolora* (L.) from Nethybridge, Inverness, iv.2009; and *Lymantria dispar* (L.) from Hampshire, viii.2009, associated with an introduced breeding colony and attracted to a pheromone lure.

KNILL-JONES, S. A. – A selection of species recorded by the exhibitor at Totland, Isle of Wight during the 2009. Most significant among these were examples of *Scopula rubiginata* (Hufn.), the first VC10 record on 4.viii.; *Trachea atriplicis* (L.), recorded on 1. & 18.viii.; *Trigonophora flammea* (Esp.), recorded on 21.x.; *Catocala fraxini* (L.), recorded on 17.ix.; and the first county record of *Catocala electa* (View.) on 21.viii.

LANGMAID, J. R. – An aberration of *Hemithea aestivaria* (Hb.) taken at Southsea, Hants., on 21.vi.2009 exhibiting unchequered wing fringes (shown with a typical example of the species for comparison).

LOWE, N. R. – Photographic evidence of the discovery of *Synanthedon scoliaeformis* (Borkh.) at new localities in Radnorshire and Breconshire by the exhibitor and P. J. & V. F. Clarke. Also shown was a specimen of *Hypena obsitalis* (Hübn.) taken by C. D. Lowe in Plymouth, Devon on 13.x.2009.

MASTERS, I. D. – From Middleton-on-Sea, Sussex, examples of *Mythimna l-album* (L.), *Calophasia lunula* (Hufn.) and *Platyperigea kadenii* (Frey.), all new to the site in 2009; also from this site an overlooked specimen of *Eupithecia ultimaria* (Boisd.) taken on 2.ix.1993 that becomes the fourth British record of the species. From Owlsmoor, Sandhurst, Berkshire, the first site record of *Odontosia carmelita* (Esp.) and a minor aberration of *Idaea aversata* (L.).

A specimen of *Itame brunneata* (Thunb.) from Maidenhead, Berkshire, on 27.vi.2009 was exhibited on behalf of the captor L. J. Finch, with a list of the five Berkshire records of this species that occurred in 2009. The other records listed were as follows: Dry Sandford Pit, 31.v. (Reading & District NHS), Wokingham, 31.v. (E. Napper), Windsor Great Park, 1.vi. (two) (D. J. White, L. J. Finch) (see also M. C. Harvey exhibit).

MEREDITH, S. – A photo exhibit that included pictures of *Sesia bembeciformis* (Hübn.), *Deilephila porcellus* (L.) and, most interestingly, *Synanthedon formicaeformis* (Esp.), the latter species from Glapthorn, Northants, 22.vi.2009, nectaring at bramble *Rubus fruticosus* agg. flowers.

MCCORMICK, R. F. – Species of interest recorded in Devon during 2009 by a number of recorders, although the specimens shown were not necessarily those recorded during the 2009 season. Species exhibited included the following: *Scopula emutaria* (Hübn.), the first county record from Dawlish Warren, 25.vi. (captors: K. Rylands, I. Lakin); *Lymantria dispar* (L.), one of two examples taken at Exminster Marsh, 30.vi.; *Lacanobia splendens* (Hübn.), the first county record from

near Whiddon Down, 29.vi. (captor: R. Wolton); *Dryobota labecula* (Esp.), the second and third county records taken at Holcombe on 28. & 30.x.2009, this site also having produced the first county record in 2005; *Moma alpium* (Osb.), Halsdon NR, 29.v., a new site for this species; *Catocala sponsa* (L.), a probable immigrant example, the third county record, from Teignmouth on 21.viii. Also shown was a striking, suffused form of *Ourapteryx sambucaria* (L.) taken by S. & C. Stripp at Heavitree, Exeter on 9.viii.2009 (Plate 11, Fig. 7).

Among a number of other species exhibited, taken outside Devon, were dark examples of *Eulithis populata* (L.), *Noctua comes* (Hübn.) and *Diarsia mendica* (Fabr.) taken during a trip to Scotland, although these all fell within the range of forms of these species regularly encountered in the Highlands.

Owen, J. – Moths from the exhibitor's garden near Dymchurch, East Kent, recorded new to the site in 2009: *Pasiphila chloerata* (Mab.), *Arctia villica* (L.), *Agrochola helvola* (L.) and *Xanthia ocellaris* (Borkh.), these bringing the total number of macrolepidoptera recorded from this long-standing recording site to 515 species. Also shown were the third example of *Laconobia splendens* (Hübn.) to be recorded from the site, 14.vii.2009, and an aberration of *Noctua pronuba* (L.), 25.viii.2009, showing a weak suffusion of dark scaling across the hindwings.

Page, A. – A selection of species recorded or reared by the exhibitor during the 2009 season. These included examples of *Pelosia muscerda* (Hufn.) and *Pelosia obtusa* (H.-S.) from Cromes Broad, Norfolk on 12.vii.; *Setina irrorella* (L.) bred from larvae found at Hurst spit, Dorset on 5.v.2009; *Paracolax tristalis* (Fabr.) specimens bred from a female taken at Blean Woods, E. Kent on 17.vii.2008, with a comment that the larvae fed entirely on dead oak leaves; *Sesia apiformis* (Clerck) found as an adult at How Hill, Norfolk on 12.vii.; *Chortodes elymi* (Treit.) from Caister-on-Sea, Norfolk on 13.vii.; and *Ennomos quercinaria* (Hufn.) bred from a female taken on the Burren, Co. Clare on 13.viii.2008.

Plant, C. W. – An exhibit describing *Diachrysia stenochrysis* (Warren), a sibling species of *Diachrysia chrysitis* (L.), suggesting it is an overlooked resident species in Britain and showing apparent examples of both species.

Platts, J. – An aberration of *Paracolax tristalis* (Fabr.) lacking the characteristic forewing fasciae usually shown by this species from Blean Woods, Kent (Plate 11, Fig. 6). Also bred specimens of a strongly banded form of *Achlya flavicornis* (L.) from near Canterbury, Kent, where it has occurred since 2002; *Cymatophorima diluta* (D. & S.) ab. *nubilata* Robson from a West Sussex locality where it has been recorded in 2008 and 2009 as 15–20% of the population; and a strongly contrasting form of *Alcis repandata* (L.) from Chepstow, Mons.

Rouse, T. – An exhibit featuring in the main a range of species of interest taken in Kent during 2009 that included the following: *Drepana curvatula* (Borkh.), Folkestone, 31.vii; *Itame brunneata* (Thunb.), three of six examples recorded Denstead Wood on 31.v.; *Hyles euphorbiae* (L.), Densole, 26.vi.; *Lymantria dispar* (L.), singles recorded at Folkestone on 4. & 19.viii.; *Lithosia quadra* (L.), Folkestone, 4.viii.; *Photedes extrema* (Hübn.), Densole, 7.vi.; and *Hypena obsitalis* (Hübn.), Lydd-on-Sea, 7.ix. Also shown was a specimen of *Noctua janthina* (D. & S.) taken at Cothill Fen, Oxfordshire, on 18.vii.2009 with a comment that this may represent the first county record of the species.

Scanes, J. – A selection of species recorded from Norman's Bay, Sussex during June, July and August 2009, these including the following: *Spilosoma urticae* (Esp.), *Meganola albula* (D. & S.), *Mythimna obsoleta* (Hübn.) and *Orthonama vittata* (Borkh.). Probable immigrants recorded from this site included six *Spodoptera exigua* (Hübn.) on 25.vii. and *Deltote bankiana* (Fabr.) on 28.vi.

Fig. 5 BENHS Annual Dinner 2009: (l to r) John Muggleton, Rob Parker, Roger Hawkins, Robert Norledge, Mike Simmons and Andrew Halstead. Photo: Cathy Pickles.

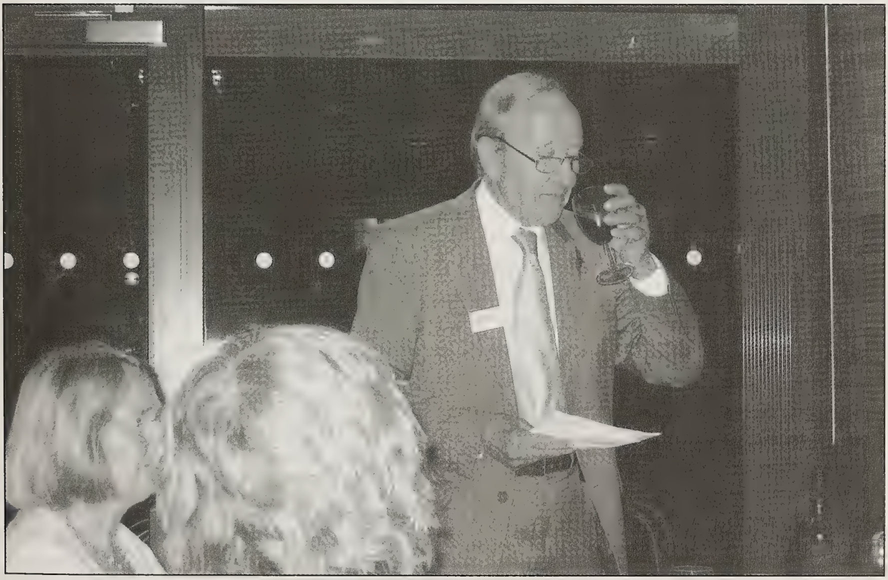

Fig. 6 BENHS Annual Dinner 2009: The President, Brian Elliott, and his wife, Pat Elliott. Photo: Cathy Pickles.

Sherman, N. – A selection of species of interest taken in Suffolk during the 2009 season. These included the first Suffolk record of *Lampropteryx otregiata* (Mete.), recorded at Dunwich Forest, 31.vii.; *Itame brunneata* (Thunb.), from Ipswich on 30.v., one of at least twenty records in the county in 2009; and *Deltote bankiana* (Fabr.), from Ipswich on 30.vi.

Sterling, M. J. & P. H. – A selection of mainly immigrant species taken during the 2009 season at West Bexington, Dorset. These included some exciting species, most notably the second British specimen of *Crocallis dardoinaria* (Donzel), recorded on 22.viii. by P. H. S. & D. Foot; *Eublemma purpurina* (D. & S.), recorded on 17.viii. by R. Eden; and *Chrysodeixis acuta* (Walk.), recorded on 30.x. by D. Foot.

Waring, P. – An illustrated exhibit detailing the second season of survey work on *Leucodonta bicoloria* (D. & S.) in Co. Kerry, Ireland, in vi. & vii.2009, with a pair of specimens exhibited. Light-trapping was carried out over four nights between 4. & 10.vi. with a total of 83 males and one female recorded. Larval searches were carried out between 24. & 27.vii. resulting in a single final instar larva and an adult female being beaten from birch, with additional males recorded at light during this period indicating a long flight period.

British microlepidoptera

Beaumont, H. E. – *Opogona omoscopa* (Meyrick), Skelton, Guisborough, N.E. Yorks (VC62) to mv light 15.viii.2008, leg. D. Money (Plate 11, Fig. 11). Although this moth has previously been recorded under glass in S.W. England this was thought to be the first to be taken outdoors in Britain. However an earlier misidentified example from Co. Durham has recently been recognised.

Beavan, Ms S. D. – *Monopis weaverella* (Scott), Jacobstowe, Devon SS5900 (VC4) owl pellet collected 10.vi.2009 moths emerged 14.viii.2009, together with owl pellet showing many exuviae, over 30 of this species and some of *Tinea semifulvella* Haworth which also emerged. There are few British rearing records of *Monopis weaverella* and apparently none from a bird pellet. New to VC4. *Monopis laevigella* (D. & S.), Zeal Monachorum Devon SS719039 (VC4) 11.vi.2009 at light, exhibited for comparison with *M. weaverella*. *Argyresthia cupressella* Walsingham, Zeal Monachorum 9.vi., 12.vi. and 3.vii.2009 at light. New to VC4 and clearly resident in the area. *Pancalia schwarzella* (Fabr.), Braunton Burrows, Devon SS43 (VC4) larva on *Viola canina* 18.vii.2008, moth reared 1.vi.2009. The first record of the larva being found in England. *Celypha cespitana* (Hübn.), Kynance, Cornwall SW6385 (VC1) larva on *Viola hirta* 11.viii.2009, moth reared 9.ix.2009. There are few VC1 records of this species. *Celypha aurofasciana* (Haworth), Stover, Devon SX8375 (VC3) 4.vii.2009 at light. *Dichrorampha sedatana* Busck, Instow, Devon SS4731 (VC4) 6.v.2009, probably the first VC4 record for over 50 years. *Sclerocona acutellus* (Eversmann), Zeal Monachorum 1.vii.2009 at light. Second VC4 record and from the same site as the first which was on 17.vi.2007. *Agdistis meridionalis* (Zeller), Black Carn, Cornwall SW3622 (VC1), larva on *Limonium binervosum* 5.ix.2009, moth reared 15.x.2009. The most westerly English record. *Platyptilia isodactylus* (Zeller), Porthgwarra, Cornwall SW3721 (VC1) 14.viii.2009. There are few VC records of this species and this is the most westerly.

Bland, K. P. – *Bucculatrix thoracella* (Thunberg), larval workings and cocoons found on *Tilia* sp. at Blackford, Edinburgh, NT2571, Midlothian (VC83), 9.x.2009, new to Scotland; *Enteucha acetosae* (Stainton), a third Scottish locality at Dowlaw Coast, Berwicks, NT8370, Berwickshire (VC81), mines collected 21.ix.2009, moth emerged 15.x.2009 (most are overwintering as cocoons); *Ethmia pyrausta* (Pallas),

single larva found NW of Cairnwell, NO1277, East Perthshire (VC89), 21.vii.2009, probably in second instar, unfortunately died after three moults, it fed on *Thalictrum alpinum,* new to VC89 and first record of the larva in Britain.

BUTCHER, A. G. J. – *Monopis monachella* (Hübner), Grain, TQ8876, W. Kent (VC16), one of two specimens taken from this new locality in Kent.

DEANS, M. J. – *Ethmia quadrillella* (Goeze), Bawdsey, TM337379, E. Suffolk (VC25), 7.viii.2009, at mv, probable migrant example, the first and second site records were taken on 6.viii. & 7.viii.; *Evergestis limbata* (L.), Bawdsey, TM337379, E. Suffolk (VC25), 4.vii.2009, mv, one of two trapped that night, probable migrants, a further specimen was taken on 20.vii.2009; *Assara terebrella* (Zincken), Bawdsey, TM337379, E. Suffolk (VC25), mv, probable migrant example and first site record.

DICKERSON, B. – *Lyonetia clerkella* (L.), photograph of a mine on elm. On 16 October 2009 Kevin Royles found this mine close to Brington, Huntingdonshire (VC31), and sent the photograph to the exhibitor for confirmation. As this was a food plant for the species with which he was not familiar, it was shown to Dr. J. R. Langmaid who was of the same opinion and added that he had found two vacated mines on *Ulmus pumila* × *japonica* at Farnham Park, Surrey, 22.ix.2007. The usual hosts are members of the Rosaceae and *Betula* spp., though in recent years it has also been found on laurel (Lauraceae). *Cameraria ohridella* (Deschka & Dimic), a series of photographs showing horse chestnut trees, *Aesculus hippocastanum,* in new leaf and flower during September 2009 at Priory Park, St. Neots, Huntingdonshire (VC31) after a severe attack by this species earlier in the year. A further tree with new leaves was found in Offord Cluny, Huntingdonshire, 23.x.2009.

DOBSON, A. H. – *Scrobipalpa acuminatella* (Sircom), Broughton Down NR, SU2833, S. Hants (VC11) 16.v.2000; *Scythris crassiuscula* (Herrich-Schäffer), Broughton Down NR, SU2833, S. Hants (VC11) 26.vi.2005; *Metriotes lutarea* (Haworth), Pamber Forest, SU6161, N. Hants (VC12) 15.v.2004, second VC record; *Cochylis molliculana* Zeller, Kempshott, Basingstoke, SU6050, N. Hants (VC12), 7.vi.2008, at mv light, third VC record (G. A. Henwood, leg.) (all detd. gen. J. Clifton); *Hofmannophila pseudospretella* (Stainton), 28.vii.2008, aberration with black shading missing, enhancing stigma (G. A. Henwood, leg.); *Cosmopterix pulchrimella* Chambers, Portchester Castle, SU6204, S.Hants (VC11), 10.x.2009, numerous flying in sunshine over pellitory-of-the-wall at the base of the castle walls (G. A. Henwood, leg.); *Thaumatotibia leucotreta* (Meyrick), Brighton Hill, Basingstoke, SU6249, N. Hants (VC12) 14.ix.2008, bred larva from orange obtained from Asda Store.

FINCH, G. L. & M. A. – *Scythris inspersella* (Hübn.), Center Parcs, SK6364, Sherwood Forest, Nottinghamshire (VC56) 15.vi.2008; *Tachystola acroxantha* (Meyrick), Cotgrave Forest, SK643326, Nottinghamshire (VC56) at mv light 29.viii.2009; *Elachista humilis* Zeller, Llangorse Lake SO137268, Breconshire (VC42) ex mine 24.v.2009; *Psychoides verhuella* Bruand, Quarry Grace Dieu Wood, SK432180, Leicestershire (VC55) ex larval spinning iv.2009; *Chrysoesthia drurella* (Fabr.), North Farm, Dadlington SP3999, Leicestershire (VC55), 10.vi.2009; *Coleophora ibipennella* Zeller, Center Parcs Elveden Forest, TL791805, West Suffolk (VC26) ex larval case 18.vi.2009; *Bucculatrix ulmella* Zeller, St. Catherine's Wood, WV705527, Jersey, Channel Islands (VC113), mv light 10.viii.2009; *Bucculatrix maritima* Stainton, Les Landes, WV550566, Jersey, Channel Islands (VC113) mv light 8.viii.2009; *Caloptilia stigmatella* (Fabr.), Grouville Marsh, WV701494, Jersey, Channel Islands (VC113) ex larva 10.viii.2009; *Celypha lacunana* (D. & S.), Grouville Marsh WV701494, Jersey, Channel Islands (VC113) ex pupa 10.viii.2009; *Epiphyas postvittana* (Walker), Co-op Car Park, St. Ouen Jersey, Channel Islands (VC113) ex

larva 10.viii.2008; *Pleurota aristella* (L.), Les Landes, WV550566, Jersey, Channel Islands (VC113) mv light 8.viii.2009.

HALL, N. M. – *Assara terebrella* (Zincken), Harcourt Drive, Earley, SU735710, Berkshire (VC22) 1.vi.2009 and 28.vi.2009. The exhibitor sees up to three per year. *Cochylis molliculana* Zeller, Waltham Place, Berkshire (VC22), with others for comparison; *Eudonia pallida* (Curtis), Hastings Country Park, E. Sussex (VC14), 25.ix.2009, exhibited as a mystery, this was identified by V. Proklov, J. R. Langmaid *et al.*

HECKFORD, R. J. – *Plutella haasi* Staudinger, Beinn Eighe, Wester Ross (VC105) 5.vii.2009 (Plate 11, Fig. 8), one of five specimens seen but only this specimen retained, as well as a photograph of the moth in the wild, with specimens of *P. xylostella* (L.) and *P. porrectella* (L.) for comparison. Previously the species was known in the British Isles only from one specimen taken at Beinn Eighe on 11.vii.1954. In continental Europe known only from six localities, five in Norway and one in Sweden. *Levipalpus hepatariella* (Lienig & Zeller), near Beinn Tioraidh, Coll, Mid Ebudes (VC103) larva amongst *Antennaria dioica* 26.vi.2009, moth reared 28.vii.2009. *Gynnidomorpha permixtana* (D. & S.) a male near Tràigh Hogh, Coll, and a female, confirmed by genitalia examination, near Machair Mhór, Coll, both on 29.vi.2009. New to VC 103 and in Scotland previously known only from possibly three localities, all in Main Argyll (VC98), the most recent record apparently being at Connel in July 1985. *Acleris umbrana* (Hübn.), near Ayrmer Cove, South Devon 9 (VC3) larva in spun leaves of *Prunus spinosa* 19.ix.2009, moth reared 25.x.2009. *Bactra lacteana* Caradja, Cnoc Mór, Coll, 25.vi.2009, one male, confirmed by genitalia examination. New to VC 103 and third Scottish locality. *Endothenia oblongana* (Haworth), Heybrook Bay, South Devon (VC3) larva in rootstock of *Plantago lanceolata* 11.x.2008, a ♂ reared 24.iv.2009. British literature suggests that the larva feeds on *Centaurea nigra,* possibly in the flower head, but this may be due to confusion with *Endothenia marginana* (Haworth). This is probably the first time that the larva has been found in the British Isles. *Catoptria furcatellus* (Zetterstedt), Beinn Eighe 2.vii.2009. *Scoparia pyralella* (D. & S.), near Ayrmer Cove larva under a slight web amongst dead leaves of *Plantago lanceolata* 17.iii.2009, moth reared 24.iv.2009. This appears to be only the second time either in the British Isles or continental Europe that the larva has been observed, the first being one found amongst the roots of *Rumex acetosella* on 7.v.1908. *Udea uliginosalis* (Stephens), two moths reared on 23 & 26.viii.2009 from ova obtained from a female collected on 6.vii.2009 in the Beinn Eighe area. The larva initially fed on grass blades and *Potentilla erecta* and *Alchemilla* sp. leaves but later fed on *Taraxacum* sp. leaves. Probably the first time in the British Isles that the species has been reared from ova. *Amblyptilia punctidactyla* (Haworth), Loch Achilty, East Ross (VC106) 13.ix.2009 an aberrant specimen with most of the dark grey colour of the forewing replaced with white, together with a typical specimen for comparison.

HENWOOD, B. – *Epermenia insecurella* (Stainton), Wembury, South Devon (VC3) 21.viii.2009, presumed immigrant as the foodplant *Thesium humifusum* does not occur in Devon, new County record. *Pseudatemelia josephinae* (Toll), Week Wood near Chulmleigh, North Devon (VC4), new VC record. *Ptycholomoides aeriferanus* (Herrich-Shäffer), Week Wood near Chulmleigh, North Devon (VC4), new VC record. *Calybites phasianipennella* (Hübn.), Abbotskerswell, South Devon (VC3), new VC record. *Evergestis limbata* (L.), Shaldon, South Devon (VC3).

JENKINS, A. – *Diplopseustis perieresalis* (Walker), London, TQ288781, Middlesex (VC21), ix.2008, taken in his living room having come in through the open door and been attracted to the desk light. Determination by Michael Shaffer (from a

photograph). Previously known in British Isles only from Tresco, Isles of Scilly in 2001 and (from a photograph) Exeter, Devon on 5.xi.2007. Described from Sarawak. Known from Taiwan, India, China, Australia, with records also from Spain, Portugal, Gibraltar and the Balearics.

KNILL-JONES, S. – Moths taken at Totland, Isle of Wight (VC10). Amongst them were *Catoptria verellus* (Zincken), 30.vi.2009; *Pempelia palumbella* (D. & S.), two contrasting forms, 20.vi.2009 and 1.vii.2009; *Pediasia contaminella* (Hübn.), 23.ix.2009; *Dioryctria simplicella* Heinemann 17.ix.2009 and *Pterophorus spilodactylus* (Curtis).

LANGMAID, J. R. – *Caloptilia semifascia* (Haworth). Four specimens of what used to be called *Caloptilia hauderi* (Rebel) which has now been proved by DNA sequencing performed by Dr. Carlos Lopez-Vaamonde to be a first brood form of *C. semifascia*. Consequently, all previous records of *C. hauderi* in Britain should be regarded thus. *Yponomeuta malinellus* Zeller, two specimens bred from *Malus domestica*, Portsmouth, S. Hants (VC11) in 2009 which have pure white forewings and fringes; exhibited with one specimen of *Y. cagnagella* (Hübn.), for comparison, from which they are impossible to distinguish.

LOWE, N. R. – Species from VC42 Breconshire recorded by the Brecknock Moth Group. *Mompha locupletella* (D. & S.), Pont-ar-dulas, 16.viii.2009, second VC record; *Celypha rivulana* (Scopoli), Elan Valley, 30.vii.2009, second VC record; *Lobesia abscisana* (Doubleday), Legar, 19.vii.2009, second VC record; *Epinotia rubiginosana* (Herrich-Schäffer), Llangorse, 29.vi.2009, new to VC42; *Grapholita compositella* (Fabr.), Llangasty, 1.viii.2009, new to VC42; *Dichrorampha alpinana* (Treitschke), Llangorse, 2.vii.2009, new to VC42.

MCCORMICK, R. – *Incurvaria praelatella* (D. & S.), Ashclyst Forest, Devon, 5.vi.2009; *Argyresthia glaucinella* Zeller, West Week Farm, Chulmleigh, S. Devon (VC3), new VC record; *Dichomeris marginella* (Fabr.), Teignmouth, SX97, S. Devon (VC3), 22.vi.2009 and 13.vii.2009; *Mompha propinquella* (Stainton), Hennock, SX8281 S. Devon (VC3), 5.vii.2009, few records on the Devon moth database; *Acleris umbrana* (Hübn.), Bere Alston, SX4466, S. Devon (VC3), 27.ii.2009; *Apotomis sauciana* (Frölich), West Week Farm, Chulmleigh, SS6814, N. Devon (VC4) 26.vi.2009, uncommon in Devon; *Ancylis diminutana* (Haworth), Challacombe, Dartmoor, SS6940, N.Devon (VC4), 12.vi.2009; *Epinotia rubiginosana* (Herrich-Shäffer), Great Plantation, Devon, 12.vi.2009, only five records on the Devon database for this species, all between 2003–09; *Eucosmomorpha albersana* (Hübn.), Great Plantation, Devon, 12.vi.2009, a species for which the county database has few records and only four in the past 11 years; *Eudonia lineola* (Curtis), Braunton Burrows, SS43, N. Devon (VC4), 12.vii.2009, the first record for VC4 since seen by R. J. Heckford at Croyde Bay, 21–22.viii.1984 and 25.viii.1985; *Parapoynx stratiotata* (L.), exhibitor's garden in Teignmouth, SX97, S.Devon (VC3), 29.vi.2009; *Phlyctaenia perlucidalis* (Hübn.), Abbotskerswell, SX8568, S. Devon (VC3), 30.vi.2009, leg. R. Fox, fourth on Devon database; *Elegia similella* (Zincken), Dawlish Warren, SX9879, S. Devon (VC3), 2.vii.2009, fourth record on Devon database; *Plodia interpunctella* (Hübn.), Dawlish, SX9676, S. Devon (VC3), 5.vii.2009, infestation in peanuts; *Apomyelois bistriatella* ssp. *subcognata* (Ragonot), Challacombe, SS6940, N. Devon (VC4), 12.vi.2009, one of two Devon records submitted to the County Recorder for this year so far; *Udea uliginosalis* (Stephens), Carn an Tuirc, Braemar, NO1780, South Aberdeenshire (VC90), 25.vii.2009, one of several seen flying in sunshine near the summit; *Endotricha flammealis* (D. & S.), exhibitor's garden, Teignmouth SX97, S. Devon (VC3), 15.vi.2009, a very dark variety, mv trap.

MEREDITH, S. – *Nemophora degeerella* (L.), photographs, Old Winchester Hill NNR, SU6320, S. Hants (VC11), 5.ix.2009.

OWEN, J. – *Assara terebrella* (Zincken), Dymchurch Kent TR076319, East Kent (VC15) 1.viii.2009, new to the garden list of pyralids. There are several Norway Spruce in the recorder's garden which were planted about 25 years previously.

PROKLOV, V. V. – *Nemophora cupriacella* (Hübn.) (Adelidae). 13.vii.2008, two individuals, Wisley airfield, Surrey, UK, VC 17, TQ0657. A rare parthenogenetic species utilising scabious as a foodplant. However, in this locality it was strongly associated with teasel.

SCANES, J. – A selection of moths from Norman's Bay, Pevensey Marsh, TQ6805, E.Sussex (VC14). *Chilo phragmitella* (Hübn.), ♂♂ were very common, only 4 ?? seen; *Calamotropha paludella* (Hübn.), only two recorded, both on 28.vi.2009; *Schoenobius gigantella* (D. & S.), both sexes common, the ♀♀ being much larger than the ♂♂; *Donacaula forficella* (Thunberg), large numbers were recorded in June and July; *D. mucronellus* (D. & S.), one 25.vi.2009; *Elophila nymphaeata* (L.), *Nymphula stagnata* (Donovan), *Parapoynx stratiotata* (L.), *Cataclysta lemnata* (L.), all four China-marks were very common, seen at light and flying over the drainage ditches; *Ebulea crocealis* (Hübn.), four in June; *Phycitodes binaevella* (Hübn.), one on 4.viii.2009; *Myelois circumvoluta* (Geoffroy), just two at light in June, but mainly seen during the day resting on thistles; *Ostrinia nubilalis* (Hübn.), 30.vi.2009.

STERLING, M. J. & P. H. – *Acleris umbrana* (Hübn.), West Bexington SY5386, Dorset (VC9) at mv light 1.viii.2009, P. H. Sterling and 20.viii.2009, M. J. Sterling. The second and third records for the garden; the species may be resident locally, but searches for larvae on sloe have been fruitless to date. *Evergestis limbata* (L.), West Bexington SY5386, Dorset (VC9) at mv light on 18.viii.2009, M. J. Sterling. Likely immigrant here, though probably resident in the Purbecks in Dorset.

THIRLWELL, I. R. – *Monochroa niphognatha* (Gozmány), Portsmouth, SU6700, S. Hampshire (VC11) 29.vi.2009, new to Hampshire. New to Britain from Kent in 1984, recorded since only from Devon in 2002.

WILSON, M. R. – *Phyllonorycter platani* (Staudinger), Nottingham University, Sutton Bonington Campus, SK506261, Nottinghamshire (VC56), infestation on *Platanus* 3.xi.2009, all remaining leaves on the tree were infested by the developing mines, as many as 15 per leaf.

FOREIGN LEPIDOPTERA 2009

BEAUMONT, H. E. – Lepidoptera from a trip to Hungary and Bulgaria in early May 2009. From Hungary: *Pleurota marginella* (D. & S.), *Helcystogramma albinervis* (Geras.), *Aethes nefandana* (Kenn.), *Hyperlais dulcinalis* (Treits.), *Loxostege aeruginalis* (Hübn.), *Khorassania compositella* (Treits.), *Isauria dilucidella* (Dup.), *Stegania dilectaria* (Hübn.), *Narraga fasciolaria* (Hufn.), *Earias vernana* (Fabr.), *Cucullia balsamitae* Boisd., *Sideridis lampra* (Schaw.).

From Bulgaria: *Metzneria santolinella* (Ams.), *Phtheochroa annae* Huem., and *Cydia conicolana* (Heyl.) all new to Bulgaria. *Pseudeulia asinana* (Hübn.), *Myelopsis tetricella* (D. & S.), *Rethera komarovi* (Christ.), *Peridea korbi* (Reb.), *Dicranura ulmi* (D. & S.), *Arctia festiva* (Hufn.), *Rhoptria asperaria* (Hübn.), *Eilicrinia trinotata* (Metzn.), *Eilicrinia cordiaria* (Hübn.), *Neognopharmia stevenaria* (Boisd.), *Zethes insularis* Ramb., *Gonospileia triquetra* (D. & S.), *Behounekia freyeri* (Friv.) with fewer than ten records from Bulgaria, *Cleonymia opposita* (Led.) and *Lithophane merckii* (Ramb.).

Corley, M. F. V. – New and Interesting Lepidoptera from Northern Portugal collected in 2009. Many species of Lepidoptera reach their southern limit in the mountains of northern Portugal. Although most of these are species with a wide European distribution, sometimes extending far into Siberia, they are often very rare in a Portuguese context.

In 2009 three mountain areas in northern Portugal were visited. Many species were found which were either new for Portugal or recorded from only the second or third site in the country. Twenty-four species were exhibited. Although many were common European species, others had a more Mediterranean distribution. It is a curious feature of Portuguese mountain areas, that within the areas with cool montane climate, there are also small areas with a more or less Mediterranean climate.

Species new to Portugal: *Adela reaumurella* (L.), *Yponomeuta cagnagella* (Hübn.), *Yponomeuta irrorella* (Hübn.), *Agonopterix ciliella* (Stt.), *Agonopterix kaekeritziana* (L.), *Agonopterix doronicella* (Wocke), *Coleophora lixella* Zell., *Anchinia cristalis* (Scop.), *Argyrotaenia ljungiana* (Thunb.), **Aphelia viburnana* (Fabr.), *Archips crataegana* (Hübn.), *Pandemis cerasana* (Hübn.), **Cnephasia alticolana* (H.-S.), *Eucosma urbana* (Kennel), *Epinotia tetraquetrana* (Haw.), *Oxyptilus pilosellae* (Zell.), *Mecyna trinalis* (D. & S.), *Sphinx maurorum* (Jordan), **Watsonalla binaria* (Hufn.), *Cyclophora serveti* Redondo & Gastón, *Eulithis pyraliata* (D. & S.), *Apamea crenata* (Hufn.), **Hadena filograna* (Esper), **Epipsilia grisescens* (Fabr.) and *Dicallomera fascelina* (L.). Those marked with an asterisk had been previously listed for Portugal at one time or another, but the records were unreliable or erroneous. *Sphinx maurorum* is often treated as a subspecies of *S. pinastri* L., but the genitalia are markedly different. *Watsonalla binaria* was recorded in Portugal by many authors, but all specimens seen hitherto have been *W. uncinula* (Borkh.). *Yponomeuta irrorella* and *Agonopterix doronicella* were new to the Iberian Peninsula. *Agonopterix doronicella* is of particular interest as the nearest known populations are in the western Alps, where it feeds on *Doronicum*. In Portugal the larvae feed on *Hieracium* which like *Doronicum* belongs to the Asteraceae, but is placed in a completely different part of that family.

Second records or second sites for Portugal: *Epagoge grotiana* (Fabr.), *Cyclophora albipunctata* (Hufn.), *Scopula immorata* (L.), *Idaea luteolaria* (Const.), *Paracolax tristalis* (Fabr.) (Plate 11, Fig. 1), *Amephana anarrhini* (Dup.), *Apamea syriaca* (Osthelder), *Hadena luteocincta* (Ramb.), *Mythimna impura* (Hübn.), *Leucania comma* (L.) and *Agrotis clavis* (Hufn.).

The remaining species were known from three or more sites. *Falcaria lacertinaria* (L.), *Idaea simplicior* (Prout), *Emmelia viridisquama* (Guen.), *Dicycla oo* (L.), *Apamea lithoxylaea* (D. & S.), *Oligia fasciuncula* (Haw.), *Pachetra sagittigera* (Hufn.), *Diarsia guadarramensis* Bours. and *Eilema lurideola* (Zinck.). The *Eilema* had been frequently reported before, but so far no correctly named material has been traced. Earlier records of the *Emmelia* all refer to the dark ab. *obscura* Warren. There are two old records of *Idaea emarginata* (L.), which probably refer to *I. simplicior*, but could be the recently described *I. dromikos* Hausmann.

Pickles, A. J. – Moths from a vernal visit to France. *Cilix hispanica* Perez de Gregorio *et al.* (Drepanidae), bred from ova found on a *Prunus spinosa* twig, Prades, Pyrénées–Orientales, 230 m (Plate 11, Fig. 9). *Eurranthis plummistaria* (Vill.) (Geometridae). 18.iv.2009, St Martin de Londres, Hérault, a frequent day flying moth. *Hypena* (*Hypena*) *obesalis* Treit. (Erebidae). [AJP states that quadrafine noctuids are now included in this family rather than Noctuidae, *sensu auct*. This is presumably based on one of the most recent classifications (Lafontaine & Fibiger

2005, Revised higher classification of the Noctuidae (Lepidoptera), published in *Esperiana* 11). Martin Honey describes current thinking on the phylogeny of the Noctuidae (including other families) to be 'in a state of flux' (NMH). 20.iv.2009, Combe de Malaval, Hautes–Alpes, 1000 m. Comes readily to light after hibernation. *Caradrina* (*Paradrina*) *noctivaga* Bellier (Noctuidae). 15.iv.2009, Prades, Pyrénées–Orientales, 230 m. *Jodia croceago* (D. & S.) (Noctuidae), bred from ova, St Martin de Londres, Hérault, a common and widespread species. *Perigrapha* (*Rororthosia*) *rorida* (Frivaldsky) (Noctuidae). 18.iv.2009, St Martin de Londres, Hérault, local, but frequent where it occurs.

Plant, C. W. – Some macro moths from Bulgaria and Northern Greece, x.2009. (1) *Oncocnemis confusa* (Freyer) ssp. *michaelorum* Beshkov (Noctuidae) (Plate 11, Fig. 3). *Oncocnemis confusa* is an Asiatic species. It was discovered at Balchik, on the Black Sea coast of Bulgaria by Dr Stoyan Beshkov who recognised it as a new genus for Europe and as a new subspecies to science. He named it in honour of the two ladies present, both called Michaela, one being his wife. So far, this genus remains known only from this single locality in Europe – which is under threat of development as a golf course aided by money from the European Union. CWP was especially pleased to catch this moth in the presence of both Stoyan, who named it, and his wife, after whom it was named. Since the exhibition, the taxon has been raised to full specific rank.

(2) Between 17 & 24.x.2008, the exhibitor and Mr Phil Jenner collected Lepidoptera in south-west Bulgaria and Northern Greece. They travelled by camper van to Sofia, Bulgaria where they were met by Dr Stoyan Beshkov, Lepidopterist at the National Museum of Natural History, Sofia, Balázs Benedek of the National Museum of Natural History, Budapest and Tamás Hácz from Budapest, Hungary. They undertook a circular route, starting and ending in south-west Bulgaria and extending into adjoining Greece, with four nights under canvas in each country, mostly in high altitude sites. 17.x.2008 Dragoman, Tchepun, Bulgaria (**BG**), 42°56′43″N 22°56′14″E, 975 m: 18.x.2008 Kresna Gorge, **BG**, 41°45′37″N 23°09′17″E, 236m: 19.x.2008, Kozhuh, Petrich, **BG**, 41°27′36″N 23°15′17″E, 175 m: 20.x.2008 Kanálo Monastery, Káto Olimbos, Greece (**GR**), 40°00′30″N 22°28′07″E, 820 m: 21.x.2008 Amfissa, Stereá Ellåda, **GR**, 38°33′26″N 22°23′25″E, 670 m: 22.x.2008 Karakolithis, near Livadeia, Stereá Elláda, **GR**, 38°27′32″N 22°46′30″E, 375 m: 23.x.2008 Thermopyle, Stereá Elláda, **GR**, 38°47′23″N 22°30′58″E, 375 m: 24.x.2008 Malinova Burchina, near Kalimantzi, South Pirin Mountains, **BG**, 41°27′58″N 23°29′56″E, 350 m.

Around 250 species of larger moth were encountered, including some extreme rarities and numerous Balkan endemics. A small selection of the more interesting species was exhibited along with photographs of some of the habitats studied. CWP makes regular collecting/study excursions to Bulgaria in particular and welcomes contact from experienced lepidopterists who may wish to join him on future trips. Specimens shown were:

Hepialidae: *Hepialus* (*Triodia*) adriaticus (Ost.), Kozhuh, **BG**, 19.x.2008. Saturniidae: *Perisomena caecigena* (Kupido), Kanálo Monastery, **GR,** 20.x.2009. Lasiocampidae: *Trichiura verenae* Witt, Kalimantzi, **BG**, 24.x.2008, a Balkan endemic; *Eriogaster rimicola* (D. & S.), Kalimantzi, **BG**, 24.x.2008. Lemoniidae: *Lemonia taraxaci* (D. & S.) ssp. *strigata*, Karakolithis, Stereá Elláda, Greece, 22.x.2008; Geometridae: *Nebula adlata* (Stdgr.), Karakolithis, **GR,** 22.x.2008, a Balkan endemic; *Eupithecia graphata* (Treit.), Kresna Gorge, **BG**, 18.x.2008; *Aplocera dervenaria* Metzner, Kresna Gorge, **BG**, 18.x.2008, a Balkan endemic; *Enconista berytaria* (Stdgr.), Karakolithis, **GR,** 22.x.2008, a Balkan endemic;

PLATE 9

1: Upperside and 2: underside of *Argynnis cybele*, with data label notation *"aphrodite – Taken by James Walhouse in Ufton Wood Leamington in 1833"*. 3: Dorsal view, 4: Lateral view and 5: Facial view of male *Oncopsis appendiculata*, Wallascote, Cheshire 14.vi.2008. Photos 3–5 Laurence Livermore.

PLATE 10

1: *Pyronia tithonus* ab. *subalbida*, Dorset, vii.2009, S. J. Rook. 2: *Melitaea athalia* ab. *cymothoe*, temperature experiment, bred ex captive Kent stock, P. Tebbutt. 3: *Neozephyra quercus* ab. *infraobscura*, bred ex-Dorset larvae, 2009, J. Clarke. 4: *Argynnis paphia* extreme homoeotic female, bred v.2009, A. M. Jones 5: *Aglais urticae* near ab. *osborni*, temperature experiment, bred K. E. J. Bailey. 6: *Argynnis aglaja* ab. *pallida*, northern England, 13.vii.2009, P. Tebbutt. 7: *Argynnis aglaja scotica* ab. *suffusa*, Isle of Barra, 27.vii.2009, M. Parker. 8: *Cynthia cardui* unusual ab. *rogeri*, temperature experiment, bred K. E. J. Bailey. Scale bar 10 mm.

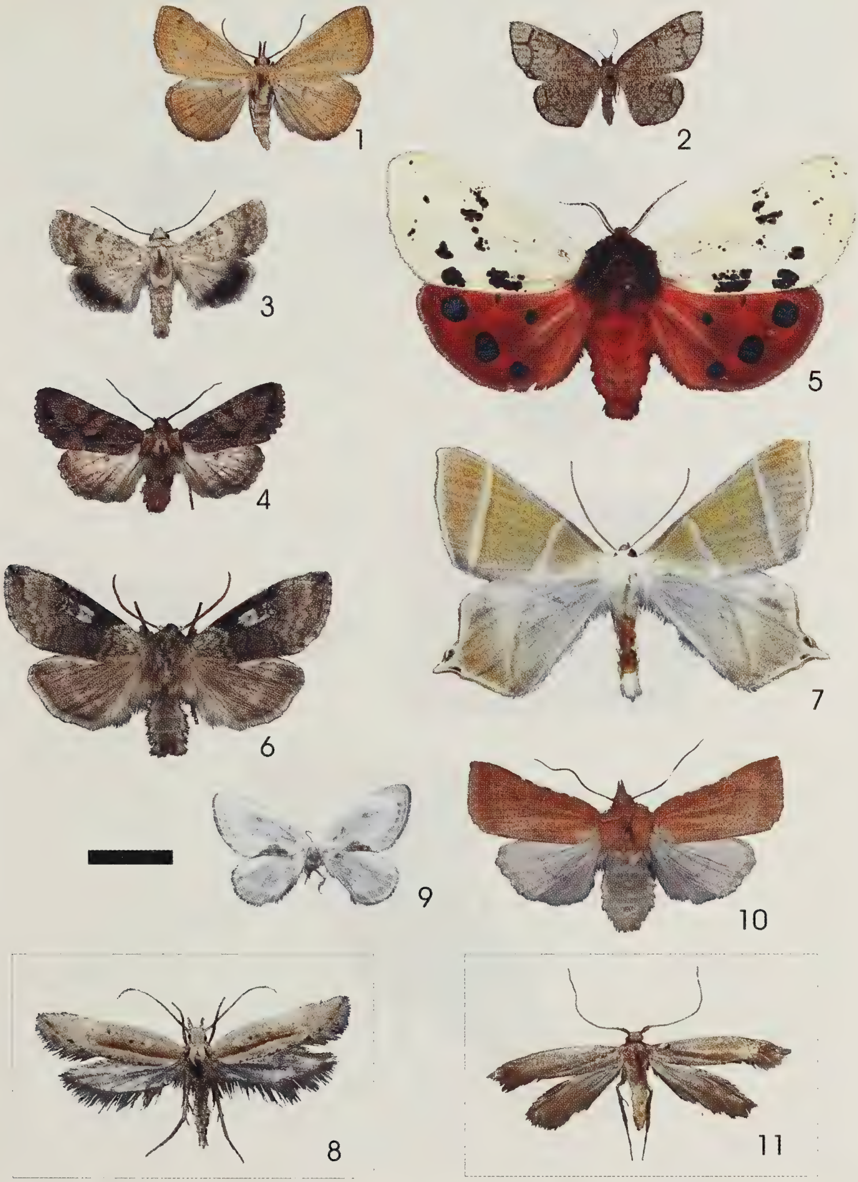

PLATE 11

1: *Paracolax tristalis*, Portugal, 2009, M. F. V. Corley. 2: *Lomographa cararia*, Merriott, Somerset, 1.vii.2009, D.Evans. 3: *Oncocnemis confusa michaelorum*, Balchik, Bulgaria, 14.viii.2009, C. W. Plant. 4: *Dryobotodes tenebrosa*, F_1 stock from Durlston, Dorset, R. R. Cook. 5: *Arctia caja*, Enochdhu, Perthshire, 11.vii.2009, D.C.G. Brown. 6: *Achlya flavicornis*, bred F_1 stock from Canterbury, Kent, J. Platts. 7: *Ourapteryx sambucaria*, Heavitree, Devon, 9.viii.2009, R. McCormick. 8: *Plutella haasi*, Beinn Eighe, Wester Ross, 5.vii.2009, R. J. Heckford. 9: *Cilix hispanica*, bred ex ova, Prades, France, 2009, A. J. Pickles. 10: *Jodea croceago*, Kozhuh, Bulgaria, 9.x.2008, C. W. Plant. 11: *Opogona omoscopa*, Guisborough, N.E. Yorkshire, 15.viii.2008, H. E. Beaumont. Scale bar 10 mm except 8 (wingspan 9 mm) and 11 (wingspan 16 mm).

PLATE 12

1: *Pantophthalmus tabaninus* with 2: mites on abdomen, Cacao, French Guiana, C. M. T. Raper. 3: *Hypoderma diana*, Sgor an Eoin, South Aberdeen, 28.v.2009, M. J. Parker. 4: *Cephenemyia auribarbis*, Glen Dee, South Aberdeen, 28.v.2009, M. J. Parker. 5: *Dryodurgades antoniae*, Wanstead Flats, Essex, 8.ix.2009, T. Bantock. 6: Live *Morimus asper*, timber yard, North Wales, October, 2009, B. Levey. Scale bar 10 mm except 2 (enlargement of 1) and 5 (length 5 mm).

Crocallis tusciaria (Borkh.), Karakolithis, **GR,** 22.x.2008; *Peribatodes umbraria* (Hübn.), Karakolithis, **GR,** 22.x.2008. Noctuidae: *Ophiusa tirhaca* (Cramer), Thermopyle, **GR,** 23.x.2008; *Atethmia centrago* (Haw.), Kozhuh, **BG**, 19.x.2008; *Atethmia ambusta* (D. & S.), Kozhuh, **BG**, 19.x.2008; *Xanthia aurago* (D. & S.), Kresna Gorge, **BG**, 18.x.2008; *Tiliacea sulphurago* (D. & S.), Kalimantzi, Pirin Mountains, **BG**, 24.x.2008; *Agrochola lychnidis* (D. & S.), Kanálo Monastery, **GR,** 20.x.2009; *Agrochola nitida* (D. & S.), Kanálo Monastery, **GR,** 20.x.2009; *Agrochola helvola* (L.), Kanálo Monastery, **GR,** 20.x.2009; *Agrochola wolfschlaegeri* Bours., Kozhuh, **BG**, 19.x.2008; *Agrochola humilis* (D. & S.), Kozhuh, **BG**, 19.x.2008; *Agrochola rupicapra* (Stdgr.), Kresna Gorge, **BG**, 18.x.2008; *Agrochola litura* (L.), Kresna Gorge, **BG**, 18.x.2008; *Agrochola laevis* (Hübn.), Kozhuh, **BG**, 19.x.2008; *Jodia croceago* (D. & S.), Kozhuh, **BG**, 19.x.2008 (Plate 11, Fig. 10); *Aporophyla australis* (Boisd.), Kozhuh, **BG**, 19.x.2008, clearly a different sub-species to the western European populations; *Aporophyla canescens* (Dup.), Thermopyle, **GR,** 23.x.2008; *Lithophane ledereri* (Stdgr.), Thermopyle, **GR,** 23.x.2008; *Lithophane lapidea* (Hübn.), Kalimantzi, **BG**, 24.x.2008; *Scotochrosta pulla* (D. & S.), Kalimantzi, **BG**, 24.x.2008; *Xylena lunifera* (Warr.), Kresna Gorge, **BG**, 18.x.2008; *Xylena exsoleta* (L.), Budapest, **HG**, 25.x.2008; *Dryobota labecula* (Esp.), Kanálo Monastery, **GR,** 20.x.2009 – both colour forms; *Dichonia convergens* (D. & S.), Kanálo Monastery, **GR,** 20.x.2009; *Dichonia aeruginea* (Hübn.), Kozhuh, **BG**, 19.x.2008; *Dryobotodes carbonis* (Wagner), Kozhuh, **BG**, 19.x.2008; *Dryobotodes tenebrosa* (Esp.), Kozhuh, **BG**, 19.x.2008; *Antitype chi* (L.), *Ammoconia caecimacula* (D. & S.), Kanálo Monastery, **GR,** 20.x.2009; *Ammoconia senex* (Geyer), Amfissa, **GR,** 21.x.2008; *Polymixis polymita* (L.), Amfissa, **GR,** 21.x.2008; *Polymixis serpentina* (Treit.), Amfissa, **GR,** 21.x.2008; *Polymixis rufocincta* (Geyer), Kanálo Monastery, **GR,** 20.x.2009; *Polymixis culoti* (Schaw.), Amfissa, **GR,** 21.x.2008, a Balkan endemic. Also included were two *Orbona fragariae* (View.), reared from eggs ex female collected by Balázs Benedek in Budapest, **HG**, during March 2009.

PROKLOV, V. V. – European Lepidoptera. (1) Species of interest to British recorders, from Russia, mostly from the Moscow region. (a) (i) *Monopis monachella* (Hübn.) (Tineidae), 1 specimen, Khripan', Ramenskoye, Moscow, 29.viii.2008; 1 individual, Ustinki, Sergiev Posad, Moscow, 24.viii.2008. A local species in Britain, confined as resident to East Anglia. "From my experience it is the commonest member of the genus in the Moscow region". (ii) *Phyllonorycter issikii* (Kumata) (Gracillariidae). 2.vii.2009 (mine on *Tilia cordata*), emerged 17.vii.2009, Zhukovsky, Moscow. An East-Asian species recently accidentally introduced to European Russia and which is spreading westwards across Europe. Larvae make underside mines typical of the genus on the leaves of lime trees. Adults are seasonally dimorphic. The exhibited specimen was of the non-overwintering brood, which has a darker ground colour. It must be noted that although the species is now very common in and around Moscow it does not cause any severe damage to the hostplants, and certainly does not prematurely defoliate them as do some of its close relatives, both indigenous (*Phyllonorycter populifoliella* (Treit.)) and introduced (*Cameraria ohridella* (Deschka & Dimic)). The species is likely to become established in the British Isles at some point. (iii) *Zygaena viciae* (D. & S.) (Zygaenidae), 2 specimens, Khripan', Ramenskoye, Moscow, 8 & 20.vii.2009. A gravely endangered species in Britain, it is probably the commonest species of burnet in Central Russia. (iv) *Endothenia quadrimaculana* (Haw.) (Tortricidae), 4 specimens, Lovtsy, Lukhovitsy, Moscow, 24.vii.2009. A local and rare species in Britain but ubiquitous in Central Russia. (v) *Agriphila poliellus* (Treit.) (Crambidae), 1 male, Khripan', Ramenskoye, Moscow, 29.viii.2008. Known in Britain by one 19th-century specimen of dubious origin: it is

also a very local and rare species in Central Russia. (vi) *Evergestis extimalis* (Scop.) (Crambidae), 4 individuals, Zhukovsky, Moscow, 2–3.vii.2009. A local species in SE England, very common in Central Russia. (vii) *Diasemia reticularis* (L.) (Crambidae), 2 specimens, Nerskaya, Orekhovo-Zuevo, Moscow, 10.viii.2008. An irregular migrant to Britain and a common one to the Moscow region. The specimens represent a locally bred second generation. (viii) *Idaea muricata* (Hufn.) (Geometridae), 1 specimen, Khripan', Ramenskoye, Moscow, 20.vii.2009. A local and rare species in Britain, it is an RDB species in the Moscow region (category 3). This find represents a new locality and will be reported in a forthcoming update of Moscow Lepidoptera. (ix) *Idaea humiliata* (Hufn.) (Geometridae). 1 specimen, Zhukovsky, Moscow, 2.vii.2009. Most probably extinct in Britain, it is an RDB species in Moscow region (category 3). This find represents a new locality and will be reported in a forthcoming update of Moscow Lepidoptera. (x) *Aedia funesta* (Esp.) (Noctuidae), 1 specimen, Zhukovsky, Moscow, 8.vii.2009; 1 specimen, Lovtsy, Lukhovitsy, Moscow, 24.vii.2009. Exhibited for comparison with the previous species, a common moth in the Moscow region. (xi) *Tyta luctuosa* (D. & S.) (Noctuidae), 3 specimens, Lovtsy, Lukhovitsy, Moscow, 24.vii.2009. A local and rare species in Britain, still locally common in Central Russia. (xii) *Pseudeustrotia candidula* (D. & S.) (Noctuidae), 3 specimens, Lovtsy, Lukhovitsy, Moscow, 24.vii.2009; 1 specimen, Zhukovsky, Moscow, 13.viii.2008; 1 specimen, Ustinki, Sergiev Posad, Moscow, 24.viii.2008. A recent addition to the British list. The generic name has been misspelt as *Pseudostrotia* in the latest edition of Bernard Skinner's guide [2009]. (xiii) *Trachea atriplicis* (L.) (Noctuidae), 1 specimen, Zhukovsky, Moscow, 8.vii.2009. Extinct as resident in Britain, a ubiquitous species in Central Russia. (xiv) *Sideridis reticulata* (Goeze) (Noctuidae), 1 specimen, Zhukovsky, Moscow, 2.vii.2009. Probably extinct as resident in the UK, it is not an infrequent species in Central Russia. (xv) *Nycteola degenerana* (Hübn.) (Noctuidae), 1 specimen, Zhukovsky, Moscow, 25.vii.2009; 1 specimen, Ustinki, Sergiev Posad, Moscow, 22.viii.2008. A recent addition to the British list (known by two specimens from S. England), this is the common member of the genus in Central Russia, where the common British *N. revayana* (Scop.) is extremely rare.

(2) Variations: (i) *Agapeta hamana* (L.) (Tortricidae), 1 specimen, Zhukovsky, Moscow, 18.vii.2009; 1 specimen, Lovtsy, Lukhovitsy, Moscow, 14.vii.2009; 1 specimen, Zhukovsky, Moscow, 25.vii.2009. Specimens with varying degree of extended markings and orange ground colour. These forms appear to be more common in Russia than in England. (ii) *Cataclysta lemnata* (L.) (Crambidae), 1 male, Zhukovsky, Moscow, 25.vii.2009. "All males seen in that locality had a very dark grey ground colour I've never seen in British ones". (iii) *Epirrhoe alternata* (Müller) (Geometridae), 1 specimen, Wandle Meadow Nature Park, London, UK, VC 17, TQ2670, 22.v.2008; 1 specimen, Zhukovsky, Moscow, 25.vii.2009. Two aberrant specimens, the British one being originally also crippled.

(3) Rare Continental Lepidoptera: (i) *Deuterogonia pudorina* (Wocke) (Oecophoridae, Deuterogoniinae), 1 specimen, Khripan', Ramenskoye, Moscow, 20.vii.2009. The only European member of the mostly East Asian subfamily (sometimes regarded as a separate family), it is a rare moth in Europe. In Central Russia it was previously known from the Vladimir and Tula regions. New for Moscow region. (ii) *Eversmannia exornata* (Ev.) (Uraniidae), 2 specimens, Khripan', Ramenskoye, Moscow, 8.vii.2009. The only European member of this mostly tropical family, it is only known from Central Russia, Belarus and Latvia. Recently reported by P. Leraut [2009] for Ukraine, but that could be a misunderstanding of the previously known data, considering the large amount of factual errors in that book. (iii) *Larentia clavaria* (Haw.) (Geometridae), 1 specimen,

Ustinki, Sergiev Posad, Moscow, 24.viii.2008. An RDB species in Moscow region (category 0). This find represents the second of the three modern records of this species from the Moscow region. It will be reported in a forthcoming update of the Moscow region. (iv) *Baptria tibiale* (Esp.) (Geometridae), 1 specimen, Ustinki, Sergiev Posad, Moscow, 25.vi.2000. The second specimen caught in Moscow region and Central Russia (the first one dating back to 1867). It was reported in the exhibitor's recent note [Proklov, V., 2008. The first modern record of *Baptria tibiale* (Esper,1791) (Lepidoptera: Geometridae) for Moscow Province. *Eversmannia* **13–14**: 84–85. (In Russian)].

(4) Species of interest to British recorders, from Portugal: (i) *Bembecia ichneumoniformis* (D. & S.) (Sesiidae), 1 specimen, Ferragudo, Algarve, Portugal, 11.ix.2006. The Portuguese specimen is ~1.5 times larger than British ones. However, it still appears to belong to this species, according to "*The Sesiidae of Europe*" [Latuvka, Z. & Latuvka, A., 2001]. (ii) *Hemaris fuciformis* (L.) (Sphingidae), 1 specimen, Nave, Serra de Monchique, Algarve, Portugal, 19.iv.2000. A rare species in Portugal.

SHERMAN, N. – A short summary of a trip to the Örség National Park and Balaton regions in south-west Hungary from 11–16.ix.2009, listing some of the species seen and habitats visited, and discussing the Hungarian Natural Heritage Trust, the charity involved in running the holiday. Photographs of some of the moths seen and the habitats visited were shown, all taken by N.S.

Unimproved meadow at Kercaszomor, Hungary; Dolomite grassland at Nyriad; group out in the field, trapping; *Blepharita satura* (D. & S.), Beautiful Arches; *Eucarta amethystina* (Hübn.), Cumberland Gem; *Diachrysia zosimi* (Hübn.), *Lemonia taraxaci* (D. & S.); *Antheraea yamamai* (Guénerin-Méneville); *Scotochrosta pulla* (D. & S.), Ash Shoulder-knot; *Auchmis detersa* (Esp.); *Episema glaucina* (Esp.), *Euxoa hastifera* (Donzel); *Artiora evonymaria* (D. & S.); *Mesogona acetosellae* (D. & S.), Pale Stigma; *Xanthia sulphurago* (D. & S.); *Catocala fraxini* (L.), Clifden Nonpareil.

STERLING, M. J. – New species of *Promalactis* (Oecophoridae) described from Hong Kong, China in 2009. The exhibit included five paratypes which are to be deposited with the British Museum of Natural History. *Promalactis quinilineata* Wang, Kendrick & Sterling 2009 (paratype); *Promalactis longiuncata* Wang, Kendrick & Sterling 2009 (paratypes); *Promalactis lobatifera* Wang, Kendrick & Sterling 2009 (paratypes); *Promalactis biovata* Wang, Kendrick & Sterling 2009.

Promalactis is a large genus consisting of over 100 species described worldwide. Most of the known species are distributed in the Palaearctic and Oriental regions. About 80 of these species have been recorded in China. Almost all the species are very colourful and exquisitely marked.

TERRY, R. – Moths of Maderia, taken 8–15.xii.2008. *Idaea atlantica* (Staint.), *Scopula irrorata* (Bethune-Baker), *Xanthorhoe rupicola* (Woll.), *Ascotis fortunata* ssp. *wollastoni* Bethune-Baker, and *Caradrina clavipalpis* ssp. *pinkeri* Kobes, Pale Mottled Willow, all Madeiran endemics. *Galgula partita* Guen., *Hypena lividalis* (Hübn.), *Hypena obsitalis* (Hübn.), Paignton Snout.

Leucania loreyi (Dup.), Cosmopolitan, *Ctenoplusia limbirena* (Guen.), Scar Bank Gem and *Cornutiplusia circumflexa* (L.), Essex Y.

WARING, P., THOMAS, R. & WARING, K. – Moth trapping in Transylvania 21.v.2009–1.vi.2009. For many years PW held the ambition to go moth trapping in Transylvania, and to enjoy the popular associations with the Dracula stories. The biennial congress of the Societas Europaea Lepidopterologica (SEL) provided the opportunity in May 2009, when the congress took place in Cluj in this part of Romania. By travelling a few days in advance, PW and his family were able to

explore the country and various castles associated with Vlad the Impaler, the real life Dracula on which Bram Stoker very loosely based his Dracula fiction, as well as moth trapping in a variety of associated habitats. A wide range of Lepidoptera was recorded and a full account will be published in due course. Accompanying photographs showed some of the countryside visited and the sights seen. Perhaps of greatest interest for British entomologists was a night spent trapping in herb-rich open fallow ground at the foot of the mountains in which Bram Stoker set his tale. Here PW captured both *Eucarta virgo* (Treit.), Silvery Gem, a recent addition to the British moth list as an immigrant, but here in its native breeding habitat, and also its close relative *Eucarta amethystina* (Hübn.), Cumberland Gem, which is on the British list on the basis of a mention in Meyrick's 1928 '*Revised Handbook of the British Lepidoptera*', which reads "Cumberland, once, probably a casual immigrant". *Siona lineata* (Scop.), The Black-veined Moth, endangered in Britain, was numerous in this habitat. At the congress PW was able to discuss the habits and ecology of *Leucodonta bicoloria* (D. & S.), White Prominent, with delegates from a number of European countries, prior to his searches, with others, for adults and larvae in Ireland this year. It appears that though widespread the White Prominent is often very local, and though sometimes frequent at light, females are rarely seen. None of the delegates had ever found the caterpillars in the wild. PW thanked all those involved with the organisation of the SEL Congress for creating this opportunity for exploration.

Waring, P. & Akite, P. – Moth trapping in Uganda at Mpanga and Mabira Forests. The exhibit was to record that the authors undertook a preliminary programme of light trapping for moths at Mpanga and Mabira Forests in Uganda in September 2009. This was a pilot project for Makerere University Zoology Department, with the main aim of investigating catch sizes, the range of species and various logistical issues associated with a choice of possible light trapping equipment. The pilot was to enable Perpetra Akite to plan a programme of collection of moth data to look for any recent changes in the moth fauna of these forests, which have been subjected to various forms of habitat degradation in recent decades. Several previous studies of moths on these sites have taken place at intervals since the 1940s, against which current data can be compared.

Photographs showed both mains and battery operated lightweight moth traps and some of the moths captured. Trials with mains-dependent traps were curtailed due to an unreliable power supply at Mabira Forest. A mains supply was not available at Mpanga Forest and use of portable generators was beyond the finances of the project, so traps involving actinic tubes operated from readily available car batteries were selected, to be operated as batches of traps simultaneously in different habitats.

During the month of September the nightly catches per 6W actinic trap varied from about 30–120 macromoths of 20–40 species. The predominant family was the Arctiidae, followed closely by the Geometridae. Noctuid moths were much less numerous. Saturniid moths occurred at the rate of one to several per trap per night, of a range of species. Sphingid moths occurred in similar numbers to the saturniids at Mpanga Forest but none at all was recorded at Mabira Forest during the three nights of sampling, despite all night operation of traps and a substantial list of the Sphingidae recorded during previous studies. Results will be published in full in due course. The help and cooperation of Makerere University Zoology Department was acknowledged.

Diptera

Dickson, R. J. – Nine species from Surrey (VC 17), South Hampshire (VC 11) and South Wiltshire (VC 8) in 2009: *Chrysotimus flaviventris* (Roser) (Dolichopodidae), ♀

ex Malaise trap, Botley Wood, S. Hants (SU5409), 7/8.vii, and ♂ same locality, 15/16.vii, leg. K.J. Wheeler; *Nematoproctus distendens* (Meig.) (Dolichopodidae), ex Malaise trap, locality as previous species, 16/17.vi, leg. K. J. Wheeler; *Sciapus longulus* (Fall.) (Dolichopodidae), ♂ swept from herb-rich calcareous grassland, Bulford Field, S. Wilts (SU1845), 22.vi; *Systenus leucurus* Loew (Dolichopodidae), ♂ ex Malaise trap, Botley Wood, S. Hants (SU5409), 25/26.vi, leg. K. J. Wheeler; *Eudorylas zonellus* Collin (Pipunculidae), ♀ ex Malaise trap, locality as previous species, occurred in some numbers in 2009, 30.vi/1.vii, leg. K. J. Wheeler; *Myopa pellucida* Rob.-Des. (Conopidae), on sunlit foliage, Mare Hill Common, Surrey, 16.iv, leg. G. R. Else; *Orellia falcata* (Scop.) (Tephritidae), ♀ swept from herb-rich calcareous grassland, Bulford Field, S. Wilts (SU1845), 8.vi; *Urophora cuspidata* (Meig.) (Tephritidae), ♀ swept, habitat and locality as previous species, 22.vi; *Linnaemya vulpina* (Fall.) (Tachinidae), Denny Wood, New Forest, S. Hants (SU3305), 21.ix, leg. K. J. Wheeler.

Halstead, A. J. – Some local or scarce Diptera taken in 2009: *Leptarthrus vitripennis* (Meig.) (Asilidae), ♂ swept, Juniper Top (Box Hill), near Dorking, Surrey (TQ182526), 28.vi; *Dolichopus virgultorum* Hal. (Dolichopodidae), ♂ swept, Holmwood Common, near Dorking, Surrey (TQ169465), 26.vii; *Arctophila superbiens* (Müller) (Syrphidae), ♀ swept, Lochwood, near Beattock, Dumfriesshire, (NY083972), 16.ix; *Brachyopa pilosa* Collin (Syrphidae), ♂ on birch stump sap, Juniper Bottom (Box Hill), near Dorking, Surrey, (TQ179526), 2.v; *Chrysotoxum elegans* Loew (Syrphidae), ♀ on wild parsnip *Pastinaca sativa* flowers, also Juniper Bottom, 23.viii; *Didea fasciata* Macq. (Syrphidae), ♂ on devil's bit scabious *Succisa pratensis* flower, near Black Loch, Wigtownshire (NX279657), 15.ix; *Nephrocerus scutellatus* Macq. (Pipunculidae), ♀ swept from *Tilia cordata*, RHS Garden, Wisley, Surrey (TQ062597), 8.v; *Cnodacophora sellata* (Meig.) (Micropezidae), ♂ swept, Merton Bridge, Berwickshire (NT610321), 17.ix; *Zodion cinereum* (Fabr.) (Conopidae), ♀ swept, Juniper Top (Box Hill), near Dorking, Surrey (TQ182526), 26.vii; *Acanthiophilus helianthi* (Rossi), ♂♀ swept from fleabane, Folkestone Warren, Kent (TR242368), 30.viii; *Campiglossa malaris* Séguy (Tephritidae), ♀ swept, RHS Garden, Hyde Hall, near Rettendon, Essex (TQ781996), 20.vii, and ♂ swept, Walton Down, near Tadworth, Surrey (TQ221571), 1.viii; *Tephritis divisa* Rond. (Tephritidae), ♂ swept, Folkestone Warren, Kent (TR242368), 30.viii; *Lauxania cylindricornis* (Fabr.) (Lauxaniidae), ♂ swept, Horsell Birch, near Woking, Surrey (SU988597), 13.vi; *Conisternum obscurum* (Fall.) (Scathophagidae), ♂ swept, Lindean Moor Lake, near Selkirk, Roxburghshire (NT50 29), 19.ix; *Subclytia rotundiventris* (Fall.) (Tachinidae), ♀ on wild parsnip *Pastinaca sativa* flowers, Juniper Bottom (Box Hill), near Dorking, Surrey, (TQ179526), 23.viii.

Hawkins, R. D. – Two flies taken during 2008 at The Moors NR, Redhill, Surrey (TQ290512), a recently declared nature reserve of the Surrey Wildlife trust: *Eristalinus aeneus* (Scop.) (Syrphidae), ♂ at water mint *Mentha aquatica* flowers beside a pond containing a great many introduced plants, 15.viii, normally a coastal species in Britain and apparently the first record for inland Surrey, but could its eggs or larvae have been brought in with the plants; *Psacadina zernyi* (Mayer) (Sciomyzidae), ♂ swept from margins of another pond where the vegetation had been allowed to develop naturally.

Meredith, S. – Photographs of several Diptera, taken in 2009: *Tabanus autumnalis* L. (Tabanidae), Blean Woods, Kent, vi; *Bombylius major* L. (Bombyliidae), Beckley Wood, E. Sussex, 12.vi; *Asilus crabroniformis* L. (Asilidae), Larden Chase, near The Ridgeway, Streatley, Berks, 22.viii; *Dexiosoma caninum* (Fabr.) (Tachinidae), Arnside Knott, Cumbria, 24.vii; four species at Noar Hill,

Hants: *Volucella pellucens* (L.) (Syrphidae), *Mesembrina meridiana* (L.) (Muscidae), *Phasia hemiptera* (Fabr.) and *Tachina fera* (L.) (Tachinidae).

PARKER, M. J. – Some notable species of Diptera encountered during 2009 from Dorset VC 9, Glamorgan VC 41, South Aberdeen VC 92, and East Perth VC 89: *Haematopota bigoti* Gobert (Tabanidae), ♀ swept from saltmarsh, Whiteford Burrows, The Gower, Glamorgan (SS444945), 5.vii; *Phthiria pulicaria* (Mikan) (Bombyliidae), ♀ swept from Nicholaston Burrows, The Gower, Glamorgan (SS515878), 7.vii; *Thereva cinifera* Meig. (Therevidae), ♀ swept, dunes, Merthyr Mawr Warren, Porthcawl, Glamorgan (SS871768), 8.vii; *Thereva fulva* (Meig.) (Therevidae), ♂ swept, dunes, Whiteford Burrows, The Gower, Glamorgan (SS434943), 5.vii and ♀ swept, dunes, Merthyr Mawr Warren, Porthcawl, Glamorgan (SS871768), 8.vii; *Chrysotoxum vernale* Loew (Syrphidae), ♀ at wood spurge *Euphorbia amygdaloides* flowers, Oakers Wood, Dorset (SY805915), 11.v; *Eupeodes bucculatus* (Rond.) (Syrphidae), ♀, Broadley Wood, Dorset (ST851056), 5.v; *Melanostoma* Form A (Stubbs & Falk, 1983) (Syrphidae), ♂♀ swept from the western slopes of Meal Odhar, 2520 feet, East Perth (NO149774), 26.v; *Pipizella maculipennis* (Meig.) (Syrphidae), ♂ swept from coastal grassland, Wyke Regis, Weymouth, Dorset (SY670767), 11.vi; *P. virens* (Fabr.) (Syrphidae), ♂ swept from chalk grassland, Little Minterne Hill, Dorset (ST6604), 16.vi; *Herina paludum* (Fall.) (Ulidiidae), ♂♀ swept amongst great numbers of this species at Old Castle Down, Bridgend, Glamorgan (SS897763), 8.vii; *Melieria cana* (Loew) (Ulidiidae), ♂ swept from saltmarsh, Whiteford Burrows, The Gower, Glamorgan (SS515878), 5.vii; *Physiphora alceae* (Preyssler) (Ulidiidae), ♂♀ swept from *Tripleurospermum inodorum*, Knighton Heath, Dorset (SY813863), 21.viii; *Campiglossa argyrocephala* (Loew) (Tephritidae), ♀ swept from grassland, west of Braemar, South Aberdeen (NO141913), 27.v; *Rhagoletis alternata* (Fall.) (Tephritidae), ♂♀ swept from burnet rose *Rosa pimpinellifolia*, dunes, Whiteford Burrows, The Gower, Glamorgan (SS434943), 5.vii; *Tephritis ruralis* (Loew) (Tephritidae), ♂ as previous species; *Trupanea amoena* (Frauenfeld), (Tephritidae), ♀ swept, Nicholaston Burrows, The Gower, Glamorgan (SS515878), 7.vii; *Phasia barbifrons* (Girschner) (Tachinidae), ♂ swept from heathland, Wytch Farm, Dorset (SY883883), 23.viii; *Cephenemyia auribarbis* (Meig.) (Oestridae), 1♂ caught and several others seen, Glen Dee, South Aberdeen (NN995908), 28.v. (Plate 12, Fig. 4); *Hypoderma diana* Brauer (Oestridae), ♂ on a path near the River Dee, Sgor an Eoin, South Aberdeen (NN995907), 28.v. (Plate 12, Fig. 3).

PERRY, I. – A selection of uncommon Diptera found during 2009: *Dilophus bispinosus* Lundström (Bibionidae), Denbies, Surrey, 22.viii, ♀ amongst numerous *D. febrilis* (L.) swept from flowers of wild parsnip *Pastinaca sativa*; *Crossopalpus setiger* (Loew) (Hybotidae), Whiteford NNR, Glamorgan, 10.vii, only the fourth British record, but previously found on the Gower at Oxwich in 1956; *Platypalpus carteri* (Collin) (Hybotidae), Rannoch Forest, Perthshire, 14.vi, ♂ swept from broad-leaved woodland; *P. unicus* (Collin) (Hybotidae), Farley Mount, Hants, 18.v and Martin Down NNR, Hants, 19.v, at each a single ♂ swept from scrub on downland; *Fannia subatripes* d'Assis-Fonseca (Fanniidae), Camghouran, Loch Rannoch, Perthshire, 18.vi, ♂ swept from birch woodland, apparently the first record in this country since 1938; *Hydrotaea pandellei* Stein (Muscidae), Rannoch Forest, Perthshire, 20.vi, ♂ swept from broad-leaved woodland, the first British record outside the Spey Valley area; *H. pilitibia* Stein (Muscidae), Camghouran, Loch Rannoch, Perthshire, 20.vi, ♂ swept from birch woodland; *H. velutina* Rob.-Des. (Muscidae), Whiteford NNR, Glamorgan, 5.vii and Oxwich NNR, Glamorgan, 8.vii, seemingly well established on the Gower, where it was first found in 1952; *Microsoma exiguum* (Meig.) (Tachinidae), Pondhead Inclosure, New Forest, Hants,

♂ 16.v and ♀ 21.v, both swept from woodland ride – there are records from the New Forest for this species going back over a hundred years; *Gastrolepta anthracina* (Meig.) (Tachinidae), Lode, Cambs, 21.vii, in the exhibitor's garden, ♂ on fennel *Foeniculum vulgare* flowers and ♀ on *Bupleurum fruticosum*; *Parasetigena silvestris* (Rob.-Des.) (Tachinidae), Crab Wood, Hants, 18.v, ♂ on wood spurge *Euphorbia amygdaloides* flowers, the first record in this country since 1936; *Graphogaster brunnescens* Vill. (Tachinidae), Camghouran, Loch Rannoch, Perthshire, 20.vi, ♂ swept from birch woodland.

RAPER, C. M. T. – A selection of Diptera that the author has been working on during the past year. (1) Interesting tachinids collected in 2009: *Linnaemya picta* (Meigen), Kent, 19.viii. 2009 (soon to be added to the British list and exhibited on behalf of Howard Bentley); *Phytomyptera zonella* (Zetterstedt), Tidmarsh, Berks, 21.viii.2009 (listed in the Central European key as *Elfia zonella*, this is another potential new species that will be published soon by Ivan Perry); *Paracraspedothrix montivaga* Villeneuve, Tilehurst, Berks, 21.ix.2009; *Lydina aenea* (Meigen), Cogden Beach, Dorset, 29.viii.2009; *Bithia spreta* (Meigen), Cholsey, Oxon, 25.vii.2009; *Eriothrix prolixa* (Meigen), Hartslock NR, Goring-on-Thames, Oxon, 14.viii.2009; *Dinera grisescens* (Fall.), Tidmarsh, Berks, 12.vii.2009; *Sturmia bella* (Meigen), Warburg NR, Henley-on-Thames, Oxon, 16.viii.2009. (2) Some interesting Diptera from French Guiana, which are part of an ongoing personal project to learn more about the Tachinidae, Pantophthalmidae and a few other families in a small patch of the Montagnes de Kaw region: *Pantophthalmus tabaninus* Thunberg (male) from Cacao, French Guiana (Plate 12, Figs. 1 & 2). An extremely large fly of the neotropical family Pantophthalmidae, close relatives of the stratiomyids (soldier flies). The family contains just 20 species with 19 in this genus and one in the genus *Opetiops*. The larvae of *Pantophthalmus* live in galleries that they excavate in living and dead wood. Various tachinids were exhibited including *Borgmeiermyia braziliana* Townsend; and the acrocerids *Lasia* sp. and *Ocnaea* sp.

SMITH, M. N. – *Linnaemya picta* (Meig.) (Tachinidae), ♀ at hogweed *Heracleum sphondylium* flowers, next to the River Stour, near Hothfield, Kent (TQ959459), 23.ix.2009; newly recognised as British although it had been present for at least 50 years (taken in the 1950s by E. C. M. d'Assis-Fonseca at Woolwich Wood, Kent), having been confused with *L. rossica* (Zimin), which has a northern distribution in Britain.

COLEOPTERA

ALEXANDER, K. N. A. – A selection of rare beetles from sites across England during 2009. *Eucnemis capucina* Ahrens (Eucnemidae) RDB1 new county record, one in flight trap on old cherry tree, Colwall Orchards, Herefordshire, SO7642, vi.–viii.2009; *Aulonothroscus brevicollis* (de Bonvouloir) (Throscidae) RDB3, four in flight trap on old cherry tree, Colwall Orchards, Herefordshire, SO7642, vi.–x.2009; *Ptinus subpilosus* Sturm (Anobiidae) Nb, only Dorset locality, numerous in flight trap in hollow ancient oak, Melbury Park, Dorset, ST5605, xi. 2008, v. & vii. 2009; *Phloiophilus edwardsii* Stephens (Phloiophilidae) Nb, frequent on aerial dead branches with *Peniophora quercina* on mature oak trees, Thoresby Estate, Sherwood Forest, Nottinghamshire, SK6468, 24.ix.2009; *Teredus cylindricus* (Olivier) (Bothrideridae) RDB1, one knocked off fresh *Fistulina* bracket fungus on ancient oak, Thoresby Estate, Sherwood Forest, Nottinghamshire, SK6468, 24.ix.2009; *Colydium elongatum* (Fabr.) (Colydiidae) RDB3 Nb, new to west Dorset, one from recently fallen oak branch in open parkland, Melbury Park, Dorset, ST5605, 22.v.2009; *Ischnomera sanguinicollis* (Fabr.) (Oedemeridae) Nb, new county record,

one off hawthorn blossom, Melbury Park, Dorset, ST5605, 22.v.2009; *Platystomos albinos* (L.) (Anthribidae) Nb, new to west Dorset, one on fallen beech branch, Melbury Park, Dorset, ST5605, 22.v.2009; *Syagrius intrudens* Waterhouse (Curculionidae) GB internationally important but no conservation status, one swept from bracken in western sessile oak woodland, Camerance Wood, River Fal, East Cornwall, SW8338, 1.ix.2009.

ALLEN, A. J.– Some beetles collected during 2008/2009. *Haliplus varius* Nicolai (Haliplidae), Powdermill Reservoir, East Sussex, TQ7919, 23.viii.2009; *Hydroporus morio* Aubé (Dytiscidae), E. Perthshire (NO0281), 6.vii.2009, in a small pool; *Hydroporus rufifrons* (Müller) (Dytiscidae), near Ings, Westmorland, NY4498, 1.x.2009, plentiful in a pond; *Hololepta plana* (Sulzer) (Histeridae), near Santon Downham, W. Norfolk, TL818879, 11.v.2009, several found by exhibitor and David Hance under bark of dead poplar, first British record; *Saprinus planiusculus* Motschulsky (Histeridae), Blakeney Point, W. Norfolk, TF998459, 12.ix.2009, several under a dead hare; *Gyrophaena pulchella* Heer (Staphylinidae), Brede High Wood (close to Powdermill Reservoir), E. Sussex, TQ8020, 11.x.2009, several in 'toadstools'; *Phytosus nigriventris* (Chevrolat) (Staphylinidae), Dawlish Warren, S. Devon, SX9979, 20.iv.2009, several under seaweed; *Astenus serpentinus* (Motschulsky) (Staphylinidae), Beesands, S. Devon, SX8241, 22.ix.2009, several found under stones and by grubbing at roots at base of cliff; *Cafius cicatricosus* (Erichson) (Staphylinidae), Hook Spit (in Hook park), S. Hampshire, SU498052, 22 June 2009, two specimens under seaweed (David Appleton found it at the same site in 1984); *Ptinus pusillus* Sturm (Anobiidae), Adwell, Oxfordshire, SU6999, 23.xi.2008, many in a dove cote; *Phloiophilus edwardsii* Stephens (Phloiophilidae), Northiam, E. Sussex, TQ8323, 11.x.2009, plentiful by beating small oak branches; *Donacia obscura* Gyllenhal (Chrysomelidae), Sutton Park, Warwickshire, 16.vi.2009, one swept near pond; *Cossonus linearis* (Fabr.) (Curculionidae), near Santon Downham, West Norfolk, TL818879, 11.v.2009, several under bark of dead poplar; *Barynotus moerens* (Fabr.) (Curculionidae), Knighton Wood, S. Wiltshire, SU0522, 13iv.2009; *Coelositona cinerascens* (Fåhraeus) (Curculionidae), Northwick, Canvey Island, S. Essex, 23.ix.2008; one in suction sample.

BOOTH, R. G. – (1) A selection of captures including new County records. *Demetrias monostigma* Samouelle (Carabidae), Pyrford Village, Surrey, TQ038572, sieved from *Juncus* tussocks in wet meadow, 9.xi.2008, new to Surrey; *Microptilium palustre* Kuntzen (Ptiliidae), Laleham, Middlesex, TQ0569, sieving damp sedge litter at edge of shaded pond, 2.v.2009, this species has been recorded previously only from Wicken Fen, Cambridgeshire and is thus new to Middlesex; *Choleva glauca* Britten and *Choleva jeanneli* Britten (Leiodidae), Pyrford Village, Surrey, TQ035569, single females from moles' nests, 9.xi.2008, both modern records from Surrey; *Leptusa norvegica* Strand (Staphylinidae), Linn of Dee, South Aberdeenshire, NO0690, two females under thin bark of Scot's pine, 29.vi.2008, a local, generally northern species, both sexes of which can be separated readily from the similar *L. fumida* (Erichson) by their coarser, reticulate to weakly transverse abdominal microsculpture, especially visible on tergite VII, contrasting with the close, strongly transverse microsculpture of the latter, common and widespread species; *Euryusa optabilis* Heer (Staphylinidae), Laleham, Middlesex, TQ0669, one male sieving wood debris at base of hollow ash tree, 3.v.2008; *Philhygra melanocera* (Thomson) (Staphylinidae), Pyrford Village, Surrey, TQ038572, sieved from *Juncus* tussocks in wet meadow, 9.xi.2008, new for Surrey; *Haploglossa marginalis* (Gravenhorst) (Staphylinidae), Pyrford Village, Surrey, TQ039572, sieved from old bird's nest in fallen alder branch, 11.xi.2007, this species has been recorded in Surrey only rarely; *Ptinus dubius* Sturm (Anobiidae: Ptininae),

Brooklands, Surrey, TQ070623, one female from beating *Pinus nigra*, 11.xi.2007, apparently the first Surrey record; *Cryptophagus confusus* Bruce (Cryptophagidae), Laleham, Middlesex, TQ0669, one female sieving wood debris at base of hollow ash tree, 3.v.2008.

(2) Two rare beetles in the late Ian Menzies' collection, now in the NHM, London, identified recently by R. G. Booth. *Philorhizus quadrisignatus* (Dejean) (Carabidae), Bookham Common, Surrey, one beaten from honeysuckle by Upper Hollows Pond, 23.x.2002, only the second Bookham record, the first having been collected by F. J. Coulson in 1935; *Tetrops starkii* Chevrolat (Cerambycidae), Juniper Bottom, Box Hill, Surrey, one female by beating, 23.vi.2000, one of only three or four British records and an addition to the Surrey list.

DICKSON, R. J. – *Cryptocephalus bipunctatus* (L.) (Chrysomelidae) Nb, Denny Wood, New Forest, S. Hants (VC11), SU3306, 29.vi.2009, swept from wet heath; *Phyllobrotica quadrimaculata* (L.) (Chrysomelidae) (Skullcap Leaf Beetle), Botley Wood, S. Hants (VC11), SU5410, 28/29.vi.2009, Malaise trap, one of six this year, where the species is almost certainly feeding on *Scutellaria minor* Hudson, Lesser Skullcap; *Carabus monilis* Fabr. (Carabidae) Nb, Bulford Field, S. Wilts (VC8), SU1845, 13.vii.2009, on the ground in daytime, leg. K. J. Wheeler; *Agonum sexpunctatum* (L.) (Carabidae) Na, Botley Wood, S. Hants (VC11) SU5310, 21.iv.2009, netted whilst flying in afternoon sunshine; *Brachinus crepitans* (L.) (Carabidae) (Bombardier Beetle) Nb, 1 km north of Tilshead, N. Wilts (VC7), SU0348, 9.ix.2009, one of at least six under stones. on a track at an arable field-edge; *Phloiotrya vaudoueri* Mulsant (Melandryidae) Nb, Botley Wood, S. Hants (VC11), SU5409, 21/22.vi.2009, Malaise trap; *Hyleocoetus dermestoides* (L.) (Lymexylidae) Nb, Mare Hill Common, Surrey (VC17), SU9340, 16.iv.2009, netted flying in sunshine; *Ampedus cinnabarinus* Eschscholtz (Elateridae) RDB3, Denny Wood, S. Hants (VC11), SU3306, 10.v.2009, leg. G. R. Else; *Mecinus janthinus* Germar (Curculionidae) Na, Portchester Common SSSI, Portsdown, S. Hants (VC11), SU6206, 29.v.2009, swept; *Mononychus punctumalbum* (Herbst) (Curculionidae) (Iris Weevil) Na, East Cliff, Branscombe, S. Devon (VC3), SY2188, 31.v.2009, one of several on path side *Iris foetidissima* L. near the coast, leg. G. R. Else.

HAWKINS, R. D. – Some interesting beetles found during 2009 while doing conservation work on a small area of restored chalk downland at Park Downs, Banstead, Surrey, TQ266584. Almost a hectare of tall scrub, virtually woodland, was cut down about ten years ago and grazed by introducing goats, but this conservation grazing was withdrawn following a serious dog attack. Nevertheless the transition to downland continues under the influence of an autumn cut and grazing by rabbits. Cutting back scrub regrowth during the year allows the colonisation by beetles to be studied. The list includes four species of mollusc predators. Species shown, found among low vegetation unless otherwise stated, were: *Silpha atrata* L. (Silphidae), 16.viii; *Silpha tristis* Illiger (Silphidae), female, 16.iv; *Sinodendron cylindricum* (L.) (Lucanidae), female in flight, 28.v; *Onthophagus joannae* Goljan (Scarabaeidae), male flew up, 28.v; *Phyllopertha horticola* (L.) (Scarabaeidae), many in flight, 21.v; *Dascillus cervinus* (L.) (Dascillidae), female, 21.v; *Drilus flavescens* (Fourcroy) (Drilidae), male on grass stem, 21.v; *Cryptocephalus hypochaeridis* (L.) (Chrysomelidae), female on flower of *Leontodon hispidus*, 12.vi; *Chrysolina violacea* (Müller) (Chrysomelidae), female, 20.vi; *Graptus triguttatus* (Fabr.) (Curculionidae), female, 20.iv. Seen but not taken were: *Dorcus parallelipipedus* (L.) (Lucanidae), in flight, 22.v; *Lampyris noctiluca* (L.) (Lampyridae), glowing female, 1.vii and large larva, 8.ix.

HECKFORD, R. J. – A photograph taken by the exhibitor of what appears to be *Meloe brevicollis* Panzer (Meloidae), found in sand dunes on Coll, Mid Ebudes

(VC103) on 29.vi.2009. Only a single specimen was seen and this was not collected. Enquiries on the following day revealed that a similar beetle had been photographed in sand dunes at another locality on Coll a week or so earlier. This has also been identified as *Meloe brevicollis*. The species has not previously been recorded from Scotland.

LEVEY, B. – (1) Some species of Buprestidae from the E. Mediterranean region, including a number of endemic species and subspecies from Crete, Cyprus and Lebanon. *Acmaeodera* (*Acmaeotethya*) *biseriata* Reitter, Horsh Ehden Nature Reserve, N. Lebanon, 29.iv.–4.vi.2001; *Acmaeodera undulata* Abeille de Perrin, Termessos National Park, Antalya Province, Turkey, 30.vi.1987; *Anthaxia* (s. str.) *passerinii* (Pecchioli), Termessos National Park, Antalya Province, Turkey, 30.vi.1987; *Anthaxia* (s. str.) *platysoma* Abeille de Perrin, Kemer, Antalya Province, Turkey, 12.vi.1987; *Anthaxia* (*Melanthaxia*) *baiocchii* Magnani & Izzillo, Horsh Ehden Nature Reserve, N. Lebanon, 29.iv.–4.vi.2001; *Buprestis guttatipennis* Abeille de Perrin, Horsh Ehden Nature Reserve, N. Lebanon, July 2001; *Julodis pubescens yveni* Mannerheim, Rethimnon, Crete, 18.vii.1982; *Lamprodila* (*Ovalisia*) *klapaleki kairouzi* Magnani et al, Bcharre (Nord), Lebanon, 24.v.2004; *Lamprodila* (*Palmar*) *festiva holzschuhi* Hellrigl, Horsh Ehden Nature Reserve, N. Lebanon, 29.iv.–4.vi.2001; *Perotis margotana* (Novak), Vrysses, Chania, Crete, 27.iv.1982; *Perotis susannae* (Novak), 2 km N. W. of Pegeia, Pafos district, Cyprus, 16.vi.2009; *Phaenops delagrangei* (Abeille de Perrin), Horsh Ehden Nature Reserve, N. Lebanon, July 2001.

(2) A live female specimen of *Morimus asper* (Sulzer) (Cerambycidae) from a timber yard, N. Wales, (Plate 12, Fig. 6) October 2009. This flightless European species is superficially similar to the rare native species *Lamia textor* (L.).

MORRIS, M. G. – Some Coleoptera associated with species of *Salvia* (Lamiaceae). No British beetles are known to be associated with our species of *Salvia* (sages), many of which are introduced or rare. However, the more numerous Continental species in the genus are hosts to some phytophagous Coleoptera, a few of which are exhibited here. *Crosita salviae* (Germar) (Chrysomelidae: Chrysomelini) near Tsarkva, Bulgaria (North-East Region), 7.vi.2008, on unidentified *Salvia* sp.; *Cassida* (s. str.) *atrata* Fabr. (Chrysomelidae: Cassidinae), Rimetea, Alba Province, Romania, 21.vii.2008, general tapping, this very distinctive species is known to feed on *Salvia* spp.; *Cassida* (*Lordiconia*) *canaliculata* Laicharting (Chrysomelidae: Cassidinae), Hautes-Alpes near Col d'Eschelle, France, 20.vii.1998, under rosette of *Salvia* sp., and near Tsarkva, Bulgaria (North-East Region), 12.vi.2008, at roots of an unidentified *Salvia* sp.; *Cassida* (*Odontionycha*) *viridis* L. (Chrysomelidae: Cassidinae). Pichl, Oberösterreich, Austria, 28.vii.1982, host not recorded but according to Continental authors this species feeds on a range of Lamiaceae, including *Salvia* spp., though usually found in Britain on *Mentha* spp.; *Squamapion elongatum* (Germar) (Apionidae, Kalcapiini), near Baigneux-les-Juifs, Cote d'Or, France, 4.vi.1997, tapped from *Salvia pratensis* and Tarn-et-Garonne, near Brousse, France 3.v.2005, by general sweeping; *Phrydiuchus* spp. (Curculionidae, Ceutorhynchinae), the five species in this genus are exclusively associated with *Salvia* spp., the genus was revised by the American curculionologist Rose Ella Warner (1969) because of the species' potential importance as biological control agents against *Salvia aethiopis*, a pest weed in the western USA; *P. spilmani* Warner, Sottecamini, Rome, Italy, 30.iv.1980, on *Salvia verbenaca* L. (leg. E. Colonnelli); *P. tau* Warner, near Brashnovets, Bulgaria (South-East Region), 19.v.2009, on *Salvia aethiopis*, this species was very common on several *Salvia* spp., especially by searching at the roots; *P. topiarius* (Germar). Cevennes National Park, Lozere, France, 17.v.1978, in leaf litter among grasses under scrub oak (leg. E. Duffey), this species has been frequently worked for by the exhibitor without success, in contrast

to *P. tau*; *Eusomus ovulum* (Germar) (Curculionidae, Entiminae, Sciaphilini), near Baigneux-les-Juifs, Cote d'Or, France, 4.vi.1997, tapped from *Salvia pratensis*, this species, erroneously recorded previously from the British Isles, is polyphagous, but in France, particularly, was frequently taken on *Salvia pratensis* or by sweeping the plant.

Hymenoptera

Badmin, J. S. – Galls of the Australian eulophid wasp *Ophelimus ?maskelli* Ashmead on leaves of *Eucalyptus gunnii*, *E. cordata* and *E. gunnii* × *cordata*, Newnham, Kent, October 2009, confirmed by Andrew Halstead. The reddish protuberances on the leaves of nearby growing *E. nitens* were not of insect origin and possibly caused by a physiological response to water stress. European collected specimens of the wasp are currently referred to as *O. ?maskelli* as it appears to differ slightly from material from its country of origin.

Dickson, R. J. – *Arge melanochroa* (Gmelin in Linnaeus) (Argidae), ♀♂, swept from herb-rich pasture, Bulford Field, S. Wilts (VC8), 8.vi.2009: *Xiphydria camelus* (L.) (Xiphydriidae) alder wood wasp, ♀, Malaise trap, Botley Wood, S.Hants (VC11), 13/14.vi.2009, leg. K. J. Wheeler, one of seven at the site this season; *Brachygaster minutus* (Olivier) (Evaniidae), Malaise trap, Botley Wood, S. Hants (VC11), 30.vi/1.vii.2009, leg. K. J. Wheeler, where its host is probably the dusky cockroach *Ectobius lapponicus* (L.), which is quite common there; *Formica candida* Smith (Formicidae), workers, swept from bog, Denny Wood, New Forest, S. Hants (VC11), 14.ix.2009; *Andrena ferox* Smith (Apidae) RDB1, ♀, Hollands Wood, New Forest, S.Hants (VC11), 24.iv.2009 leg. G. R. Else; *Abia sericea* (L.) (Cimbicidae) on white umbellifer blossom, Botley Wood, S.Hants, 25.vii.2009, leg. K. J. Wheeler; *Auplopus carbonarius* (Scopoli) (Pompilidae), ♂, Malaise trap, Botley Wood, S. Hants, 26/27.vii.2009, leg. K. J. Wheeler; *Gasteruption jaculator* (L.) (Gasteruptiidae), ♀, collected in a Malaise trap, Botley Wood S. Hants, 1/2.vii.2009, leg. K.J.Wheeler.

Halstead, A. – Some local or uncommon sawflies recorded in 2009. Tenthredinidae: *Pristiphora subbifida* (Thomson), ♀, swept from field maple, RHS Garden, Wisley Surrey, 21.iv.; *Parna apicalis* (Brischke), ♀, swept from *Tilia cordata*, RHS Garden, Wisley, Surrey, 21.iv.; *Anoplonyx destructor* Benson, ♀, swept from larch, Hydon Heath, Surrey, 26.iv.; *Strongylogaster macula* (Klug), swept from ferns, Cucknells Wood, Surrey, 26.iv.; *Perineura rubi* (Panzer), ♀, Cucknells Wood, Surrey, 26.iv.; *Heterarthrus wuestneii* (Hartig), swept from field maple, Box Hill, Surrey, 2.v.; *Amauronematus krausi* T & B, ♀, swept from aspen, Holmwood Common, Surrey, 4.v.; *Fenusella glaucopis* (Konow), ♀, swept from aspen, Horsell Birch nr Woking, Surrey, 9.v.; *Dolerus bimaculatus* (Geoff.), ♂♀, swept Jugger Howe Moor, NE Yorks, 29.v.; *Loderus gilvipes* (Klug), ♀, swept Little Beck Wood, NE Yorks, 30.v.; *Dolerus gessneri* André, ♀, Seivedale Fen, Dalby Forest, nr Thornton le Dale, NE Yorks, 31.v.; *Pristiphora wesmaeli* (Tischbein), ♀, swept from larch, Hydon Heath, Surrey, 19.vii.; *Apethymus serotinus* (Muller), ♀, swept from oak sapling, Hydon Heath, Surrey, 6.x.

Meredith, S. – Photographs of the following species of sawfly: *Abia sericea* (L.) adult resting on larval foodplant *Succisa pratensis*, Barnridge Copse, Bentley Wood, Wilts., 8.vi.1994; greater horntail, *Uroceras gigas* (L.), Tugley Wood, Surrey, 14.vii.2002; a (noisy) mating pair of birch sawfly *Cimbex femoratus* (L.) at Morgan's Hill, Wilts, 9.vi.2009; *Megalodontes ?klugii* (Leach) feeding on umbellifer flower heads.

Wheeler, K. J. – (1) Two specimens of *Protichneumon pisorius* (L.) recorded from Botley Woods, S. Hants, 2009. Known hosts for this parasitoid are members of the family Sphingidae. The male individual emerged from the pupa of a pine hawk *Hyloicus pinastri* (L.), collected originally from under a carpet of pine needles in the wood. The female individual was netted in the same vicinity, at rest on *Betula* foliage.

(2) A specimen of the ichneumonid *Rhyssa persuasoria* (L.) netted near felled conifers, West Walk, S Hants, 28.vii.2009. This large ichneumon is a denizen of pine woodland where it is often seen searching for its host, greater horntail, *Uroceras gigas* (L.).

Dermaptera

Philp, E. G. – A small exhibit of British earwigs with examples of all the current native species – *Labia minor* (L.), *Apterygida media* (Hagenbach), *Forficula auricularia* L. and *Forficula lesnei* Finot. This included a specimen of the macrolabic form of *F. auricularia* taken on the Dipterist's Forum field meeting at Whiteford nature reserve on the Gower on 7th July 2009. The six established alien species were also listed and examples of *Anisolabis maritima* (Bonelli) and *Euborellia annulipes* (Lucas) were shown that had been taken on 17th April 2009 in the tropical biome at the Eden Project, Cornwall during the British Myriapod and Isopod Group field meeting to that area.

Hemiptera

Bantock, T. – *Dryodurgades antoniae* (Melichar) (Cicadellidae) (Plate 12, Fig. 5) swept from broom, Wanstead Flats, Essex, 8.ix.2008, new to U.K.

Deans, M. J. – *Leptoglossus occidentalis* Heid. (Coreidae), Bawdsey, East Suffolk, TM337379, VC25, at mv light, 19.ix.2009, second county record.

Dickson, R. J. – *Euides speciosa* (Boheman) (Delphacidae), Titchfield Haven NNR, S. Hants, VC11, SU5302, at mv light, 14.viii.2009; *Delphax pulchellus* (Curtis) (Delphacidae), Eype's Mouth, Dorset, VC9, SY4491, swept on the undercliff; *Ulopa reticulata* (Fabr.)(Cicadellidae), Denny Wood (heath), S. Hants, VC11, SU3306, 3.ix.2009, swept off *Erica/Calluna*; *Kelisia guttula* (Germar) (Delphacidae) female, Botley Wood, S. Hants, VC11, SU5410, 25–26.vii.2009, Malaise trap, leg. K. J. Wheeler; *Dicranocephalus medius* (Mulsant & Rey) (Stenocephalidae) Notable B, Bulford Field, S. Wilts, VC8, SU1845, 8.vi.2009, on *Euphorbia* sp.; *Anthocoris sarothamni* Douglas & Scott (Anthocoridae) female, Browndown coastal range, S. Hants, VC11, SZ5799, 1.vi.2009, beaten from *Cytisus scoparius* (L.); *Rhacognathus punctatus* (L.) (Pentatomidae), Mare Hill Common, Milford, Surrey, VC17, SU9340, 16.iv.2009, swept from *Calluna*.

Knill-Jones, S. – *Leptoglossus occidentalis* Heid. (Coreidae), Totland, Isle of Wight, one on 27.x.2009 and two on 30.x.2009, taken at mv light.

Neuroptera

Plant, C. W. – Some ant lions (Myrmeleontidae) taken at light in Hungary, Romania and Bulgaria in the last few years. Examples of seven species of ant lion caught incidentally by the exhibitor in various light-traps whilst recording Lepidoptera. *Myrmecaelurus trigrammus* (Pallas) ♂, Bugac, Hungary, 10.viii.2009; ♀, Kavarna, Bulgaria, 15.viii.2009; *Euroleon nostras* (Fourcroy) ♂, Bugac, Hungary, 20.viii.2009; *Distoleon tetragrammicus* (Fabr.) ♀, Bugac, Hungary, 20.viii.2009; *Neuroleon microstenus* (McLachlan) ♂ & ♀, Aksakovo, Bulgaria, 12.viii.2009; *Megistopus flavicornis* (Rossi), Timisoara, Romania, 28.v.2001; *Creoleon plumbeus* (Olivier) ♂ & ♀, Aksakovo, Bulgaria, 12.viii.2009; *Morter inconspicuus* Rambur ♂, Bugac, Hungary, 20.viii.2009.

General

Badmin, J. S. – A copy of The Daily Telegraph dated 27th July 2009 where the British Entomological and Natural History Society made front page news, with the Hon. Editor interviewed about the reasons for a huge plague of black flying ants that

had erupted apparently simultaneously across the entire city of London. The headline was 'Army of lovesick flying ants creates dark cloud in skies'. The reporter, Harry Wallop, produced a very comprehensive and fair account and is to be praised. This was followed by a more light-hearted interview about ants, live on Radio 5 during the evening rush hour, which began with one show host asking the other "What do you call an upside down ant?" Answer: a flippant.

PARSONS, M. S. – Butterfly Conservation: new species information sheets and provisional maps showing the distribution of selected moths recorded as part of the National Moth Recording Scheme. These included dot maps of the V-Moth *Macraria wauaria* (L.) and Figure of Eight *Diloba caerulocephala* (L.) which have shown reductions in range supporting the Rothamsted data which indicated at least a 90% decline since the late 1960s, and Pale Pinion *Lithophane hepatica* (Clerck) which has shown a marked expansion northwards in recent decades.

STUBBS, A. E. – Buglife news: a map and notes explaining the National Stepping Stones Project. The project focuses on brownfield (the subset comprising previously developed land that has acquired wildlife interest), now a BAP Priority Habitat, with the aim of locating and evaluating the best invertebrate sites within areas chosen for the current phase: Cornwall (notably china clay pits and old mineral workings), South Essex (expanding on part of the Thames Gateway Project), Stoke-on-Trent, North Merseyside, Doncaster-Humberside and Stockton-Teesmouth. Those with knowledge of these areas were invited to help with relevant information and advice. The outcome will be a conservation action strategy to address the fastest declining BAP Habitat type, which supports pioneer and early successional invertebrate faunas rarely catered for on traditional semi-natural habitat protected sites.

SHORT COMMUNICATION

Further records of *Asiraca clavicornis* (Fabr.) (Hemiptera: Delphacidae) on London and Thames Estuary brownfield sites. – Just over ten years ago, we were moved to publish our London and south-eastern records of *Asiraca clavicornis* (Jones & Hodge, 1999), because, although it was never common, it seemed to have all but disappeared from the wider distribution it once enjoyed. This is a striking and distinctive plant-hopper, not easily overlooked, so a dearth of records does, probably, indicate a genuine scarcity.

The bug's historical status is not absolutely clear, however. Buckton (1890) stated briefly that it was 'rarely taken; or at least it has been very seldom recorded'. Edwards (1896) described it as widely distributed but not common, and gives localities from Norfolk to Devon. Le Quesne (1960), in keeping with the styles of the Royal Entomological Society handbooks of the time, is abruptly succinct, offering the meagre information that it occurs south of the Wash/Bristol Channel line. By the time Kirby (1992) reviewed its status more thoroughly, it appeared to have more or less vanished from much of the southern England where it previously occurred sporadically, and contracted to the London area. It was only very infrequently found away from the metropolis.

However, in London and the Thames Estuary, it appears to be quite widespread and is a regular feature of brownfield sites in the area. It occurs where there is a mixture of short and long grasses, tall flowery herb growth, but areas of bare ground, disturbed soil and well-drained substrate, usually with crushed brick and concrete from demolished buildings. Ironically, its association with London brownfield sites was first made over 70 years ago, when Edelsten (1940) found it on the 'waste' areas of Tilbury Docks.

Kirby (1992) allocated it a status of nationally scarce (notable B); its continued regular presence in the London area, but not elsewhere, supports the maintenance of this status. The following is a list of recent records.

Vice-county 21, Middlesex. Earl's Court, TQ250784, railway sidings disused about 5-10 years, 16.v.2008 (RAJ). Thames Barrier Park East, TQ415800, recently disturbed derelict land, 14.vi.2009 (RAJ).

Vice-county 17, Surrey. Canada Water, Rotherhithe, TQ355795, former wharfs and docks, disused and demolished at least 20 years, 6.vii, 24.ix.2007 (RAJ).

Vice-county 18, South Essex. Gallions Reach, Becton, TQ444809, former industrial wharfs, long disused (50 years?), 21.iv.2005 (RAJ). Cuckold's Haven, Barking, TQ442832, former wharfs (?) disused at least 50 years, now local nature park, 21.v.2007 (RAJ). Beam Reach, Dagenham, TQ508824, former industrial works, demolished 10–20 years, 5.vi.2007 (RAJ). Abbey Mills, Stratford, TQ387829, long disused (25 years?) and demolished wharfs with extensive scrub and herb growth, 11.v.2008 (RAJ). Beckton Gas Works, former industrial site, TQ483814, 22.v.2008 (PJH).

Vice-county 16, West Kent. Crayford Stadium Rough, TQ511744, former rail yards, disused 50 years (?), now green open space, 27.v.2006, 22.v.2007, 3.vii.2007 (RAJ). Bluewater, TQ580741, former chalk quarry now containing consumer retail park, but retaining short chalk swards, 1.vi.2006, 1.v.2007 (RAJ). Swanscombe Marshes, TQ607760, mixture of former grazing marshes, gravel extraction and former wharfs, 21.vi.2006, 30.iv.2007 (RAJ). Belvedere, Thames Mead, TQ500802, derelict land with buildings demolished, 6.ix.2006 (RAJ). Erith Gravel Pit, TQ5047800, former gravel pit, disused 20 years (?), 20.ix.2006 (RAJ). Grove Park, Hither Green, TQ401729, broad railway embankment, now local nature park, 18, 25.v.2007 (RAJ). Church Path Pit, Northfleet, disused chalk quarry, TQ623740, 21.v.2008 (PJH). Western Chimney grassland, Northfleet Cement Works, TQ620746, 21.v.2008 (PJH). Vineyard Pit, Northfleet Cement Works, TQ619743, 14.viii.2008 (PJH).

Vice-county 15, East Kent. Rochester Riverside, TQ747687, former wharfs, warehouses and railway yards, disused and partly demolished 20–30 years, 16.iv.2004, 9.vi.2004 and 1.ix.2004 (RAJ). Conyer Brickworks, near Sittingbourne, TQ960653, former brickworks long disused and abandoned (70 years?), 30.v.2006 (RAJ). – Richard A. Jones, 135 Friern Road, East Dulwich, London SE22 0AZ, bugmanjones@hotmail.com and Peter J. Hodge, 8 Harvard Road, Ringmer, Lewes, East Sussex BN8 5HJ, peter.hodge@mypostoffice.co.uk

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Edwards, J. 1896. *The Hemiptera-Homoptera (Cicadina and Psyllina) of the British Islands*. London: L. Reeve & Co.

Jones, R. A. & Hodge, P. J. 1999. Notes on the occurrence of the planthoppers *Reptalus panzeri* (Loew) (Hemiptera: Cixiidae) and *Asiraca clavicornis* (Fab.) (Hemiptera: Delphacidae). *British Journal of Entomology and Natural History* **12**: 239–240.

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INVERTEBRATE TRANSLOCATION – A CODE OF CONSERVATION PRACTICE

Invertebrate Link (JCCBI)

Summary of main recommendations (see text for definitions of translocation and other terms)

1 Translocation should be considered only in conjunction with other conservation measures.
2 When attempting to maintain a population whose habitat could be damaged or destroyed by human activity, opt for translocation only as an absolute last resort.
3 Consult widely before deciding to attempt any translocation.
4 Determine a clear objective for every translocation, based on an understanding of the population structure of the species concerned.
5 Understand the ecology of the species to be translocated in sufficient detail.
6 Undertake research to establish the suitability of the proposed reception site(s).
7 Select the stock to be released, according to appropriate genetic and ecological criteria.
8 Obtain permission (in addition to any licences that may be legally required) to use both the reception site and the source of material to be translocated.
9 Consider carefully whether the proposed activities will harm any donor population and whether evidence of a lack of harm can be provided if required.
10 Ensure that appropriate long-term management of the reception site(s) is feasible and is implemented.
11 Include host-specific parasites in (re-)establishment.
12 Ensure that sufficient individuals are released to secure (re-)establishment.
13 Record the details of the translocation meticulously.
14 Ensure that the outcome of (re-)establishment or reinforcement is continually assessed and adequately recorded.
15 Report all translocations to the relevant repositories of records, subject to any essential need for confidentiality.

Introduction

Plants or animals can be **translocated** in an attempt to **re-establish** them at sites of previous extinction, or to **establish** them where they have not previously been recorded. In the present code of practice, the terms used respectively to describe these two kinds of **translocation** are **reintroduction** and **novel introduction** (*see also* 'Definitions', below). At a site where a species is present but in decline, specimens can be released for the purpose of **reinforcement**.

Reintroduction is widely accepted as having potential value for the conservation of taxa[1] and of the communities with which they are associated. The value of novel introduction is less widely accepted but could be considerable in certain circumstances. In order to help ensure that either activity will have predominantly positive results, it is important for them to be adequately planned, co-ordinated, monitored, documented and undertaken using appropriate techniques. Accordingly, in 1986, Invertebrate Link (JCCBI) produced the first edition of the present code, which then referred only to the re-establishment of insects. This was published as JCCBI (1986) Insect re-establishment – a code of conservation practice, *Antenna*

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[1] In this context, the term 'taxa' usually refers to individual species. It may sometimes refer to sub-specific taxa.

10(1): 13–18. Since that time, new experience has been gained in some aspects of re-establishment. Also, the need to appraise the appropriateness of re-establishments has arisen in new circumstances; for example, in species recovery plans under the UK Biodiversity Action Plan. Moreover, it has become increasingly evident that climate change is affecting the distributions of species, both geographically and within micro-sites, and therefore has implications both for reintroduction and novel introduction in various respects.

When the first edition of this code was produced, there was little other guidance on the translocation of invertebrates. Since then, and in the light of the above developments, a number of organisations have produced relevant publications such as position statements or codes. There has, however, remained a need for up-to-date guidance, which applies to all terrestrial and freshwater invertebrates. The present code is intended to fill that need. It should be used with reference to the official policy[2] of the British statutory conservation agencies.

1 Cautionary Foreword

If a species is declining, the key requirement for its conservation is to ensure that suitable habitat exists throughout its natural range, and thus to safeguard that habitat wherever it occurs. Attempts to translocate a species to individual sites can never be a substitute for habitat conservation and should not be proposed in mitigation of proposed developments that would destroy habitats elsewhere. Such attempts can, however, form a useful part of a conservation strategy, provided that they have a clear rationale and are planned and conducted in an appropriate manner.

There are divergent views for and against translocation, which partly reflect ‘philosophical’ attitudes for or against human intervention in natural processes. In this context, an important rationale for intervention is that it is designed to mitigate a situation that is considered to be an ‘unnatural’ result of human activity. Views differ also about the probability of success (which experience shows sometimes to have been under-estimated) and about the effects that translocation could have on other species and on the genetic constitution of the populations of the subject species. Invertebrate Link believes that appraisal of proposed translocations (hitherto involving only re-establishments) has in some instances been based on a misunderstanding of the underlying principles. It urges that any proposal should be appraised thoroughly, taking into account its rationale and its ecological and genetic implications. It is therefore *recommended* that no specific proposal for invertebrate translocation be condemned or approved without full discussion and consideration.

The present code of practice is not intended to give detailed guidance on every possible scenario, but Invertebrate Link is always willing to be consulted on particular cases and to facilitate the provision of advice from appropriate individuals or organisations.

2 The case for translocations in the context of a changing environment

Whilst it is not the purpose of this code to advocate translocations for conservation, there is a case for considering them as a means of overcoming some of the barriers to natural dispersal that have increasingly arisen because of changing land-use over the last 50 years.

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[2] McLean, I. F. G. (2003) *A Policy for Conservation Translocations of Species in Britain.* Joint Nature Conservation Committee, Peterborough, UK, 34 pp.

In the past, a relatively diverse invertebrate fauna co-existed with traditional types of land-use over much of the UK. Changes in land-use, such as the intensification of agriculture and the re-development of sites previously used for housing or industry ('brownfield land') have, however, increasingly led to the degradation and destruction of habitats. Even at sites that have escaped intensification, the discontinuation of practices such as rotational grazing has led to a vegetational succession that adversely affects many of the invertebrates which previously thrived at such sites.

Owing to the above changes, considerable distances or physical barriers now often lie between sites where conditions are suitable for species with relatively exacting habitat requirements. Some of these species have very limited powers of dispersal and are therefore unlikely to move far enough to colonise sites at which conditions have become newly favourable, or to re-colonise sites after chance local extinctions. Certain sites are large enough to accommodate the internal movement of species between micro-sites, but such movement depends on a suitable form of long-term management.

Where suitable habitat exists but is too isolated to have been naturally re-colonised, there is a rationale for intervention in the form of reintroduction. This could also play a rôle in the creation of new reserves in areas where habitats have been destroyed by former land-use. Even at sites where species have persisted with changing land-use, their survival can be affected by climate change. Some sites could thereby become less suitable while perhaps others become more suitable. Where land use prevents a species from colonising sites beyond its normal dispersal distance and perhaps even beyond its former climatic range, there could be a case either for reintroduction or for novel introduction (see Clause 6.1.3).

3 Definitions (with relevant commentary)

In the interests of consistency with international and inter-disciplinary usage, the first four of the following definitions (in double quotation marks) are quoted from the International Union for Nature Conservation[3].

- "*Reintroduction*: an attempt to re-establish a species[4] in an area which was once part of its historical range, but from which it has been extirpated or become extinct[5] ('Re-establishment' is almost synonymous, but implies that the reintroduction has been successful)."
- "*Translocation*: deliberate and mediated movement of wild individuals or populations from one part of their range to another." [In other definitions, the meaning of 'translocation' is not necessarily restricted to movement within the current geographical range of the subject species]
- "*Reinforcement/Supplementation*: addition of individuals to an existing population of conspecifics."
- "*Conservation/Benign Introductions*: an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an

[3] IUCN (1998) *Guidelines for Re-Introductions*. Prepared by the IUCN/SSC Re-introduction Specialist Group, IUCN, Gland, Switzerland and Cambridge, UK, 10pp.

[4] In the IUCN (1998) *Guidelines*, the term 'species' is used to denote the taxonomic unit that is to be established. In particular cases, it may be appropriate to define a lower taxonomic unit (e.g. subspecies or race).

[5] In the IUCN (1998) *Guidelines*, a taxon is extinct when there is no reasonable doubt that the last individual has died.

appropriate habitat and eco-geographical area. (This is a feasible conservation tool only when there is no remaining area left within a species' historic range.)"[6] [In the present code, the term 'novel introduction' is used.]

- *Introduction/release*: an action involving the release of a species, irrespective of whether the species has previously been present at the site concerned.
- *Biotope translocation*[7]: a supposed attempt to translocate an area of topsoil and vegetation, together with its inhabitant invertebrates, from a site that is to be developed. (Developers sometimes propose such action as mitigation in return for planning consent. Generally, however, this form of translocation cannot conserve the biotope in all its aspects and is therefore inherently unsatisfactory. In theory, there might be some prospect of enabling selected species to survive and reproduce at the reception site, but success is very uncertain owing to the complexity of matters such as micro-climate, soil type and hydrology. In practice, few if any such attempts have been successful in the medium to long term.)

4 Aims, purposes and objectives

Invertebrate species may be translocated or otherwise released for various purposes, some of which do not involve wildlife conservation. Within the context of wildlife conservation, the principal aim of any invertebrate release should be to re-establish (or perhaps in some instances to establish) a viable population of the species or subspecies concerned. The species should be selected because it is believed to be globally extinct in the wild, or is known to have become locally extinct, or extirpated, in the area(s) into which it is to be released. Except in special circumstances, where novel introduction is to be considered, such areas should lie within the former natural range of the species and should contain suitable habitat that can viably be managed in the long term.

Outside the context of wildlife conservation, pest management and scientific research are among the more important purposes for which invertebrates are released. Pest management with the use of invertebrates may comprise biological, natural or integrated control. It could involve reinforcement within the natural range of the introduced species but more often involves novel introduction. Novel introductions are also made in scientific research, with the aim of elucidating some principle of theory or practice, but such introductions are often intentionally temporary. This code has some relevance to such activities, including the reinforcement (supplementation) of biological control agents[8]. With regard to the UK, attention is drawn to the provisions of the Wildlife and Countryside Act 1981 (Part 1, Section 14), which prohibit the introduction of alien species into the wild.

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[6] In the years since the IUCN (1998) *Guidelines* were published, there has been an increasing realisation that climate change is creating a need to consider mitigating the effects of barriers that could prevent species from moving to sites that are becoming climatically more suitable than sites that they have hitherto occupied.

[7] The words 'biotope' and 'habitat' are sometimes used interchangeably. A biotope is a defined area characterized by specific ecological features, whereas a habitat is a space (which includes food, water and shelter) suitable for the survival and reproduction of a particular species.

[8] For the release of exotic biological control agents, protocols must be observed in order to avoid undesired consequences. Current protocols are set out in the Food & Agriculture Organisation's International Standards in Phytosanitary Measures [ISPM] No. 3 (2005) *Guidelines for the Export, Shipment, Import & Release of Biological Control Agents & Other Beneficial Organisms* and ISPM No. 11 (2004) *Pest Risk Analysis for Quarantine Pests, Including Analysis of Environmental Risks & Living Modified Organisms.*

The objectives of an intended invertebrate translocation could include any or all of the following:

- To re-establish a globally, nationally or regionally threatened species within a part of its natural range where it has become extinct.
- To re-establish or reinforce a globally, nationally or regionally threatened species at sites within its current natural range, so as to help maintain dispersal within a metapopulation.
- To extend the range of a species beyond its previously known range if this is the only reasonable means of mitigating the effects of loss of suitable habitat in its former or existing range.
- To maintain and/or restore natural biodiversity.
- To provide long-term economic benefits to the local and/or national economy[9].
- To promote conservation awareness by selecting a species which has particular interest or value to people.

The first three of the above objectives are *species-orientated* and could be of key importance for the conservation of the species concerned. With regard to the third objective there is a particular need to consider the risk of displacing other organisms. The remaining objectives in the above list are *site-orientated*. The last of them often relates to the value of a species for human enjoyment (e.g. as an attractive butterfly) and might generally be regarded as of no direct relevance to biodiversity. There is, however, much value in promoting awareness – and hence support – of conservation, which in some instances might depend on the selection of a 'flagship species' for translocation.

For any proposed reintroduction, its *objectives* should be clearly formulated in detail and made freely available for examination by responsible organisations [e.g. the national statutory conservation agency and the relevant repositories of records (*see* Section 8, below, for the addresses of UK agencies.)]. The same applies regarding novel introduction, together with the additional proviso that, until such time as a detailed protocol becomes widely recognised, any proposal should be envisaged only in accordance with the criteria in Clause 6.1.3 before referral to the appropriate parties. The need for certain kinds of information to remain confidential in particularly sensitive cases is recognised.

5 The need for co-operation and for a multidisciplinary approach

Although it is possible for a lone individual to (re-)establish an invertebrate species, there is generally a need at least to consult – and in most cases to secure the active involvement of – a multidisciplinary range of individuals and organisations, representing a range of skills and regulatory rôles. They may include government personnel, staff of governmental conservation agencies, non-governmental organisations, funding bodies, universities, zoos and private breeders. It might also be appropriate to engage with the media, if the project is intended to generate publicity and public education. One or more persons should ensure co-ordination between the various bodies.

As noted above, a degree of confidentiality might be appropriate in certain circumstances. If so, special care should be taken in selecting the consultees

[9] This benefit is likely to apply only in parts of the world where a species could have value for 'eco-tourism' or for commercial use; for example in 'butterfly ranching'.

(subject to the need to ensure that all relevant views are sought) and in deciding which, if any, aspects of the project should remain confidential.

6 Planning and preparation

When the aims and objectives have been decided, the project should be planned so as to take account of key factors and to take appropriate actions. The main aspects of planning are set out below.

6.1 Biological principles and feasibility studies

Since the intention is to support the long-term conservation of the subject species, a key principle is that any proposed reception site should be assessed for its capacity to support a population of the species in the long term (see Clauses 6.1.4 and 6.1.6). Further principles apply, according to whether the objective is re-establishment, reinforcement or establishment at a site outside the known historical range of the species.

6.1.1 Re-establishment

Re-establishment should be considered when it would be the only reasonable means of filling a gap in the distribution of the species concerned. It may also be considered if it would help to redress a more general retraction in the distribution of the species, but not if this has evidently resulted from systematic factors that cannot realistically be overcome through the choice and management of the reception site(s) (*see* Clauses 6.1.4 and 6.1.6 for criteria to consider). In any case, it is recommended that no re-establishment be attempted unless the cause of extinction at the site is considered to be well understood and can be reversed. In this context, studies might show whether a previous local extinction probably occurred because of a chance event. If so, there will be reason to expect that re-establishment alone might suffice to overcome a lack of natural re-colonisation.

6.1.1.a) Previously attempted re-establishments

Thorough research into previously attempted re-establishment of the same or similar species and wide-ranging contacts with persons having relevant expertise should be started before the development of the re-establishment protocol begins.

6.1.2 Reinforcement

Reinforcement, as distinct from re-establishment, involves the release of individuals on to a site where the same species still occurs. It should be considered only if there are sound reasons for believing that the existing population is so small that it would otherwise become extinct. This is unlikely to be the case if the habitat and micro-climate are suitable or could become so through suitable management or predicted climate change. It is, however, possible that the population might have become so small as to have lost a viable level of genetic variation. Even if this is judged to be the case, the effects of introducing genes from another population should be very carefully assessed before any reinforcement is attempted.

6.1.3 Novel introduction

Novel introduction is defined by the IUCN (under the description of "conservation/benign introduction"), as being attempted outside the historic

range of the species concerned. As a general rule, it should be considered only as a last resort, when no opportunities for re-establishment at the original site(s) or range exist and only when a significant contribution to the conservation of the species will result. In certain cases, however, a lack of connectivity between sites might be preventing a species from naturally colonising areas where the habitat has become suitable because of improved management or climate change. Such colonisation has always been a natural mechanism for the survival of species in a changing environment. There is therefore a rationale for carefully considering novel introductions in instances where human land use would otherwise interfere with a natural shift in range.

6.1.4 Choice of release site and type

Unless novel introduction (see Clause 6.1.3) is to be undertaken, the site(s) should be within the historic range of the species and should contain all the necessary elements of suitable, sustainable habitat and micro-climate, as determined by research (see Clause 6.1.5). If re-establishment is intended, care should be taken to establish beyond reasonable doubt that the species is absent from the site. Equal care should be taken in planning novel introduction, despite the underlying presumption that the species concerned has never been recorded at the proposed reception site(s). The kind of evidence required to demonstrate absence will vary according to the characteristics of the species. For a wide range of species, a useful criterion could be the failure to find any individuals by *searching thoroughly during five generations*.

For any translocation to have a successful outcome, the reception site(s) must be suitable for the subject species in the long term. A key question to be addressed is whether the site would be large enough. Also, the site should no longer be affected by any adverse factors that have been identified as significant in a previous extinction. Attempted re-establishment of a population at an historical site may be ill-advised or even futile if the climate has changed sufficiently so as to make the location no longer suitable or habitable by the species. Also, the site ought to have assured, long-term protection, either by legal means or by voluntary agreement.

If an intended reception site is inherently suitable but does not meet all the above conditions, options for preparing it should be identified. In such instances, the site should be chosen only if the preparatory work is feasible and can be followed by suitable management following the release (see Clause 6.1.6).

In addition to considering the suitability of the site for the subject species, there is a need to consider whether any other species might be adversely affected by the (re-)establishment or reinforcement or by any associated habitat management. Primary and secondary objectives for the management of a proposed release site should therefore always be determined. The primary objectives could include (re-)establishment, in which case other objectives could become secondary.

Before a reception site is selected, a question should be addressed as to whether objections, theoretical and practical, have been given due weight. Also, permission to remove and release specimens of any species should be obtained from the owners/occupiers of the source and reception sites and, in the case of a nature reserve, the full reserve committee and scientific committee, as well as the warden. Continuing permission will be needed if there is any expectation that repeated translocations would be required. Additionally, all legal

requirements, such as the possession of licences for work involving protected species or sites, must be observed (see Clause 6.1.8, regarding relevant laws and licensing authorities in the UK).

If only small sites are available, there may be a need to (re-)establish a species at more than one site, in order to enable dispersal within a network of colonies, any of which could thereby be naturally re-established after chance local extinctions. There is, in turn, a need to determine a suitable number and distribution of sites, by considering any natural metapopulation dynamics of the species and the geographical scale.

6.1.5 Assessment of requirements for habitat management

In many instances where a site is considered for the re-establishment of a subject species, extinction has occurred because the site is no longer completely suitable and will, if selected, need to be managed in a more favourable manner. If sites are being considered for novel introduction, it is advisable in principle to select those that are already in favourable condition and that are likely to remain so.

Autecological studies should be undertaken so as to determine the critical needs of the species. The studies should identify all key aspects of the habitat (including shelter, hibernacula and the current – and potentially changing – climate and micro-climate), intraspecific variation, adaptations to spatial and temporal variation in environmental conditions and dispersal behaviour. In many instances, studies are likely to show that vegetational succession has not been adequately controlled by appropriate habitat management. Virtually no reserve (or other site) consists of 'climax' vegetation, and most are changing with time in the absence of management.

The capacity of a (re-)established population to increase, perhaps to the point where food or other resources might become scarce, should be assessed. If any species have filled a void created by the previous loss of the species concerned, they should be identified, so as to help predict the effects of (re-) establishing the subject species. The rôles of parasites, predators and diseases should also be investigated.

6.1.6 Preparation of the release site and post-release site management

The ecological conditions necessary for the subject species must be identified and imposed on the site before the (re-)establishment is attempted. If those conditions depend on continuous, regular or periodic management, this should follow an agreed, detailed plan, the implementation of which can be assured. This course of action should, however, be embarked upon only if it is compatible with the primary objectives of management for the reception site (see Clause 6.1.4). Apparently incompatible objectives can often be achieved by suitable rotational management.

6.1.7 Criteria for selection of release stock

The individuals to be released should if possible be of the same subspecies or race and of the same phenological characteristics as those that were extirpated. Suitable research should be undertaken, including the analysis and archiving of molecular data where feasible and if required as part of the protocol, to investigate the genetic make-up of the extinct colonies and of the individuals to be released. Special care is needed when the population has long been extinct.

6.1.8 Availability of suitable release stock and relevant legal considerations

If the species is legally protected, the necessary licence, if any, must be obtained. For any species, an attempt at (re-)establishment must not weaken or harm the source population from which the stock is obtained. An assessment should be undertaken to establish whether this is likely to be the case. (Most colonies of invertebrates, with a high rate of intrinsic natural increase, are able to withstand the removal of a proportion of the population if their habitat is in a satisfactory condition, although the particular proportion will vary considerably between species.)

Permission to take stock for (re-)establishment elsewhere must be obtained from the owner/occupier of the source site. Also, the provisions of all relevant laws must be complied with. [In the UK, these include, *inter alia*, the Wildlife and Countryside Act, 1981, the Wildlife (Northern Ireland) Order 1985 and the Nature Conservation (Scotland) Act 2004)]. Such provisions apply to sites that are designated, for example as National Nature Reserves or Sites of Special Scientific Interest, and to species listed under relevant Schedule(s) of the above Acts. Advice can be obtained from regional officers of the appropriate statutory conservation agency (*see* Section 8, below, for addresses).

The faunal assemblage to which the subject species belongs should be considered and it should be reproduced as far as possible on the reception site. If host-specific parasites are known to play an important rôle in the population dynamics of the species concerned, or if they are rare in their own right, they should be introduced either with the source stock or within two years, depending on the colonising potential of the species. Similar action should be considered in relation to specialised predators. An exception should of course be made where the purpose of the establishment is biological control rather than species conservation.

In order to follow the guidance in Clause 6.1.7, regarding the genetic constitution of the stock to be released, the choice should be of an ecological type most similar to that formerly inhabiting the reception site. Usually this will mean a source close to the reception site but stock from a similar biotope should be preferred to a geographically closer but dissimilar biotope.

A wild source population ought not to be endangered by the removal of individuals for translocation, and it should be monitored after the removal has taken place. Consideration should be given to captive breeding of stock for later release. In this way, numbers could be increased with less damage to the source and with the use of stocks that are often available from people who breed invertebrates for a hobby. (Re-)establishment should not, however, be attempted merely because captive stocks exist, nor solely as a means of disposing of surplus stock. If a need for repeated release is anticipated, the availability of stock must be guaranteed on a regular and predictable basis, so as to meet the specifications of the project protocol.

The stage (egg, larva, pupa, imago) for release depends on circumstances; there is no generally applicable rule. The release of adults is likely to be effective if they are of a sedentary species, provided they are likely to find advantageous sites for oviposition. If the adults are more active, especially in the case of flying insects, they might leave the site before oviposition. The number of individuals to be released should be adequate (as far as can be predicted) to achieve (re-)establishment; small numbers are often ineffective. An indication of an adequate number should if possible be gained from any records of previous attempts to (re-)establish the subject species. If immature stages are used, their

numbers should be greater than would be the case with adults, the more so with earlier immature stages, so as to allow for mortality between release and reproduction.

Detailed records of the exact procedures used in the attempt at (re-) establishment should be kept as specified in Section 7. These should include the number and the life-stage(s) of the individuals released and the date(s) of release. The location(s), perhaps including geographical positioning data, should also be recorded and mapped.

6.2 Social and political considerations

(Re-)establishments are often long-term projects that require the commitment of long-term financial and political support.

An assessment of the attitudes of local people to the proposed project may be necessary to ensure long-term protection of the (re-)established population, especially if the species was previously present but declined owing to human factors (e.g. over-collection, or loss or alteration of habitat). Where the security of the (re-)established population is at risk from human activities, measures should be taken to minimise these in the (re-)establishment area(s). If these measures repeatedly fail, the attempt at (re-)establishment should be abandoned.

7 Monitoring

All populations that are being (re-)established should be frequently and regularly monitored in order to assess their status. The monitoring should continue long enough to take account of factors that might determine success or failure, such as year-to-year differences in weather. The length of the monitoring period and the details of the techniques employed should be determined according to the characteristics of the subject species. Monitoring should start before the translocation takes place and should include an assessment of the condition of the habitat and of the status of associated species. Also, it is recommended that monitoring should include the donor population (in case the removal of individuals has had any deleterious effect) and also one or more other populations, as a 'control' against which to compare the outcome of the attempted (re-)establishment. There are established protocols for monitoring most kinds of taxa; advice on the use of such protocols should be sought from the appropriate organisation(s). Invertebrate Link can facilitate contact with organisations with particular areas of expertise.

Secretive translocation attempts can confuse others and result in lost information. All attempts at (re-)establishment or reinforcement, whether successful or not, should be reported to the appropriate repositories of records. These include the relevant local Environmental or Biological Records Centre. Butterfly Conservation acts as a national repository for translocation attempts involving Lepidoptera. Other bodies agreeing to maintain records of translocation attempts will be listed alongside a copy of this Code on the Invertebrate Link (JCCBI) web-page, at the address below. Confidentiality, if required, should be discussed with the relevant repositories of records.

8 Useful addresses

Invertebrate Link (JCCBI), c/o The Royal Entomological Society, The Mansion House, Chiswell Green Lane, St. Albans, Hertfordshire AL2 3NS
http://www.royensoc.co.uk/InvLink/Index.html

Butterfly Conservation, Manor Yard, East Lulworth, Wareham, Dorset BH20 5QP
http://www.butterfly-conservation.org/

Countryside Council for Wales, Maes-y-Ffynnon, Penrhosgarnedd, Bangor, Gwynedd LL57 2DW
http://www.ccw.gov.uk/

Natural England, 1 East Parade, Sheffield S1 2ET
http://www.naturalengland.org.uk/

Northern Ireland Environment Agency, 5–33 Hill Street, Belfast BT1 2LA
http://www.ni-environment.gov.uk/

Scottish Natural Heritage, Great Glen House, Leachkin Road, Inverness IV3 8NW
http://www.snh.org.uk/

This statement has been endorsed by the following Invertebrate Link (JCCBI) member organisations:

Amateur Entomologists' Society; Ancient Tree Forum; British Arachnological Society; British Dragonfly Society; British Entomological & Natural History Society; British Myriapod & Isopod Group; Buglife – The Invertebrate Conservation Trust; Butterfly Conservation; Conchological Society of Great Britain & Ireland; Countryside Council for Wales; Dipterists' Forum; Environment Agency; Field Studies Council; Freshwater Biological Association; National Trust; People's Trust for Endangered Species; Royal Entomological Society; Royal Horticultural Society; Royal Society for the Protection of Birds; Scottish Natural Heritage.

SHORT COMMUNICATION

Some observations on the nesting behaviour of *Colletes halophilus* Verhoeff (Hymenoptera: Apidae). – *Colletes halophilus* is a Nationally Scarce bee of saltmarshes and associated nesting habitats such as dunes and seawall embankments. It is found in south-east England from Lincolnshire to Dorset and is an endemic to those countries bordering the southern North Sea and English Channel (Kuhlmann *et al.*, 2007). It collects pollen almost exclusively from sea aster *Aster tripolium* growing on saltmarsh and brackish marshy areas inside the coastline, although a limited number of other late-flowering yellow Asteraceae may also be visited in the absence of this primary species (P. Harvey, *pers. comm.* and *pers. obs.*). It has been known for some time that this species' nest entrances are occasionally inundated by high tides (e.g. Field & Foster, 1988) and that the nests of other species of *Colletes* constructed in river banks are occasionally submerged by spate river flow. The ability to survive such events is thought to be due to the cellophane-like lining to the nest chambers that is secreted by the females, which keeps in a quite liquid food resource for the larva within and also keeps out excessive moisture from the surrounding substrate.

This restricted forage resource and occasional tendency to nest close to the tidal limit both tend to suggest that this species may be susceptible to changes in sea level, with rising water levels threatening the integrity of upper saltmarsh communities and nearby nesting locations. Work is in progress to try and quantify the severity of this threat in East Anglia. In order to gain a further insight into the tolerance of this species to nest site inundation, observations were made of a small nesting aggregation at Alresford Creek, near Colchester, Essex (TM 059197). Here, an old railway line embankment juts out into the tidal creek and has eroded into an essentially vertical face of sands and gravels at its tip. This man-made nesting site comprises a band of finer silty sand lying on basal mud/clay and over-topped with a gravelly sand mixture. The entire bank is approximately two metres high at the nest

site. The rather coarse over-burden seems to be unsuitable for *C. halophilus* nesting, with all activity observed being centred on the lower, silty sand.

Local tide tables indicated that the two highest predicted tides for 2009 were for the weekends of 22/23 August (height peaking at 5.49 metres) and 19/20 September (5.46 metres). This coincides with the nesting period of this species, a pattern of events that would happen every year. As such, the observations were felt to be what the species would have to tolerate annually, rather than merely as the result of an unusually high storm surge tide. In reality, the weather during the site visit (20 September) saw high pressure over the southern half of the country, which is likely to have slightly reduced the height of the tide that day. The nesting site was observed for approximately 40 minutes as the tide was coming in, in order to locate the lowest nest hole being visited by female carrying pollen, indicating that it was an active nest hole. Determining the relative height of any one nest was facilitated by the damp soil "benchmark" of the early morning high tide on a still day that saw little, if any, wave action. The lowest active nest was marked with a 3-inch nail pressed into the bank nearby to the hole, so as to hopefully not disrupt the tunnel system. The site was then re-visited in the early afternoon at the peak of the tide. The marked nest hole was adjudged to be approximately 7–8 cm below the water level and to have been at or below the high water mark for a total of approximately 40 minutes. For several centimetres below the lowest active nest were the washed out remains of old nesting tunnel systems, suggesting that at some time in the past this substrate was also available for use by nesting bees. This indicates a change in local environmental conditions (e.g. tidal patterns and land form changes) that is already putting a squeeze on this nesting aggregation.

There are still many unanswered questions relating to this nest location choice. Is there competition amongst females to secure a dry nesting site above the risk of inundation? This seems unlikely at this particular site, because casual observation of the available nesting substrate seemed to indicate that there was plenty of room higher up the face in which a nest could have been constructed. There may, of course, be qualities of the substrate not immediately obvious to a human observer that render these unused drier areas unsuitable. Could there even be an advantage in this brinkmanship of nesting as low down as possible? If so, what makes the location desirable? Are there differences in the larval mortality rate between inundated and permanently dry nests? Such matters will have to await a student with a good deal more time on their hands! – ADRIAN KNOWLES, Jessups Cottage, London Road, Capel St Mary, Ipswich, Suffolk, IP9 2JJ

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FIRST INCURSION OF *CONTIGASPIS ZILLAE* (HEMIPTERA: DIASPIDIDAE) IN BRITAIN

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ABSTRACT

In November 2009, a large infestation of the scale *Contigaspis zillae* (Hall) (Hemiptera: Diaspididae) was found on four *Crassula rupestris* Thunb. plants grown under glass at the Royal Horticultural Society's Garden, Wisley, Surrey, England. The plants had been imported from South Africa in May 2008. This is the first incursion of this scale insect in Britain and control measures are being taken. The biology and geographical distribution of *C. zillae* are discussed.

INTRODUCTION

Succulent plants that had originally been imported from South Africa and exhibited at The Royal Horticultural Society's (RHS) Chelsea Flower Show on the Kirstenbosch National Botanic Garden stand in May 2007 and 2008 were donated to the RHS Garden, Wisley, Woking, Surrey, where they were maintained in heated glasshouses. In October 2009, one of these plants (*Euphorbia caput-medusae* L. (Euphorbiaceae)) that had been imported in 2007 was found to be heavily infested with white euphorbia scale *Selenaspidus albus* McKenzie (Hemiptera: Diaspididae) (Malumphy & Halstead, 2010). Further investigations of the South African plants by RHS staff in November 2009 led to the discovery of two more non-native diaspid scale insects on plants imported in 2008: *Contigaspis zillae* (Hall) on four 'kebab bush', *Crassula ruprestis* Thunb. (Crassulaceae), plants and an unidentified species on a woody *Geranium* sp. (Geraniaceae). In each case samples of the infested plants were submitted to The Food and Environment Research Agency (Fera), Sand Hutton, York, for identification. The infestation on the *Geranium* sp. consisted mainly of empty male scale tests (covers) and a small number of adult females that were post-reproductive, dead, shrivelled and full of fungal hyphae. It was therefore not possible to identify the species. In contrast, the infestation of *C. zillae* on the *C. ruprestis* was thriving and there were hundreds of live scales present in the small plant sample examined by Fera. Most were live first instars and mature adult females but there were also large numbers of empty male scale tests.

Contigaspis zillae has been intercepted in Britain on two previous occasions, both at the Royal Botanic Gardens (RBG), Kew, Surrey: on *Caralluma* sp. (Apocynaceae) imported from Saudi Arabia (a small number of dead adult females, immatures and male tests), May 1981; and on *Crassula* sp. from South Africa, 11 November 1994 (many live adults and immatures). Other *Contigaspis* species have also been intercepted at the Royal Botanic Gardens on three occasions: on *Stapelia* sp. (Apocynaceae) plants imported from South Africa, 1986; *Caralluma* sp. and *Huernia* sp. (Apocynaceae) from Saudi Arabia, 1988; and *Haworthia retusa* f. *geraldii* (C.L. Scott) J. Pilbeam (Asphodelaceae) from South Africa, 1999. The specimens in the latter samples did not match any published descriptions and may represent undescribed species. However, several of the *Contigaspis* species are poorly known.

The purpose of this communication is to report the first incursion of *C. zillae* in Britain and to review its geographical distribution and biology.

Fig. 1 Infestation of *Contigaspis zillae* on *Crassula ruprestis*. Six male tests and a single adult female scale (on the right).

Slide-mounted specimens of *C. zillae* have been deposited at the Food and Environmental Research Agency, Sand Hutton, York. The host plant classification follows Mabberley (2008) with some names updated by Christopher Whitehouse, RHS Herbarium Keeper.

Detection and identification

The following observations are based on the scales collected at the Royal Horticultural Society's garden at Wisley. All developmental stages occurred on the green parts of the host plant (Fig. 1). The majority of the scales were found on the foliage rather than the stems. The adult female scale covers were 1.5 mm in length, pear shaped, strongly convex, and white with yellow, apical exuviae. Adult female bodies varied in colour from yellow-orange to pinkish to brown, becoming darker with maturity. The first instars were bright yellow, and the dark contents of their intestines were visible through the dorsum. Male scale covers were smaller than the female, each being 1.0 mm in length, elongate, flat or gently tricarinate, white with yellow exuviae situated at the anterior margin.

Contigaspis zillae was originally described by Hall (1923, as *Pinnaspis zillae*) from specimens collected from *Zilla spinosa* (L.) Prantl (Cruciferae) in Egypt. It was reassigned to the genera *Eresmaspis* and, subsequently, *Contigaspis* by Bodenheimer (1951, 1953). *Contigaspis zillae* is morphologically highly variable and has been described under three other names: *Pinnaspis acantholimoni* Bodenheimer (1949) from specimens collected from *Acantholimon* sp. (Plumbaginaceae) in Turkey; *Contigaspis monticola* Borchsenius (1949) from specimens collected from an

unknown host in Tajikistan; and *Contigaspis borchsenii* Bazarov (1967) from specimens collected from *Centaurea squarrosa* Willd. (Compositae) in Tajikistan.

Detailed morphological descriptions and illustrations of adult females are given by Hall (1923) and Borchsenius (1949). Borchsenius & Williams (1963a) also provide a good taxonomic illustration. Takagi & Moghaddam (2005) discuss morphological variation in the adult female. There are currently 14 species assigned to the genus *Contigaspis* and Borchsenius & Williams (1963b) provide a key to the world fauna.

Host range and biology

Contigaspis zillae is polyphagous, feeding on the following plants: **Amaranthaceae**: *Kochia prostrata* (L.) Schrad. **Apocynaceae**: *Calotropis procera* (Aiton) W.T. Aiton, *Caralluma* sp., *Pergularia tomentosa* L. **Boraginaceae**: *Heliotropium* sp., *Trichodesma africana* Harv., *T. calcaratum* Batt. **Capparaceae**: *Capparis* sp. **Caryophyllaceae**: *Telephium sphaerospermum* Boiss. **Compositae**: *Centaurea squarrosa*, *Helichrysum* sp. **Crassulaceae**: *Crassula ruprestris* (a new host record reported here), *Crassula* sp. (a new host record reported here). **Cruciferae**: *Farsetia aegyptiaca* Desv., *Zilla spinosa*. **Cucurbitaceae**: *Citrullus colocynthis* (L.) Schrad. **Labiatae**: *Scutellaria semenovi* Regel., *S. vilutina* Juz. & Vved. **Plumbaginaceae**: *Acantholimon* sp. **Resedaceae**: *Ochradenus baccatus* Delile, *Reseda pruinosa* Fresen. **Rutaceae**: *Haplophyllum* sp. **Santalaceae**: *Osyris alba* L. **Umbelliferae**: *Deverra tortuosus* (DC.) Benth. ex Asch. & Schweinf., *Deverra* sp., *Pycnocycla spinosa* Decne. & ex Boiss, *Pycnocycla* sp. (Bazarov, 1967; Bazarov & Shmelev, 1971; Bodenheimer, 1926; Borchsenius, 1949; Borchsenius & Williams, 1963b; Hall, 1923, 1925, 1926, 1927b; Kaussari, 1955; Rungs, 1942, 1943).

The biology of *C. zillae* has not been studied in any detail. However, it reproduces sexually, and the females lay eggs. The sex ratio in the sample from the infestation at the Royal Horticultural Society, Wisley was approximately four male tests to each adult female. Almost all the live scales were first instars and mature adult females. There were no signs of parasitism or predation in the population.

Geographical distribution

Contigaspis zillae occurs widely in Africa and the Middle East and is found in adjacent parts of Asia.

Afrotropical: Cameroon (Borchsenius & Williams, 1963b); Mauritania (Rungs, 1942); Nigeria (Borchsenius & Williams, 1963b); South Africa (new country record reported here). **Oriental**: Pakistan (Varshney, 2002). **Palaearctic**: Afghanistan (Kozár *et al.*, 1996); Armenia (Borchsenius, 1949); Egypt (Hall, 1923); Iran (Borchsenius & Williams, 1963b; Kaussari, 1955); Israel (Hall, 1927a); Morocco (Borchsenius & Williams, 1963b); Russia (Borchsenius & Williams, 1963b); Saudi Arabia (Matile-Ferrero, 1988); Tajikistan (Bazarov, 1962); Turkey (Borchsenius & Williams, 1963b); UK (a single incursion reported here, being subjected to control measures aimed at eradication).

Discussion

This is the first known incursion of *C. zillae* in Britain and it is currently being controlled. It is a sub-tropical/warm temperate species that is unlikely to be able to overwinter outdoors in Britain but could establish in glasshouse botanical collections (it was breeding at the Royal Horticultural Society, Wisley for 19 months). It is

polyphagous, feeding on plants belonging to at least 15 families including some that are commercially important in Britain, e.g., Cruciferae and Cucurbitaceae. However, it is not recorded causing any economic damage although infestations can be conspicuous and lower the aesthetic value of ornamental plants. The distribution, host range and biology of *C. zillae* are poorly known. This is due in part to difficulties in identifying the scale, as it exhibits a wide range of morphological variation.

Any findings of suspected non-native plant pests should be reported to the Plant Health and Seeds Inspectorate HQ, York (Tel.: 01904 465625).

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BOOK REVIEW

British Scraptiidae by Brian Levey. 32pp. 245 × 175mm. Published for the Royal Entomological Society by the Field Studies Council. 2009. Soft back £7.50. ISBN 978-0-90154-689-0.

Perhaps not the most engaging of our beetle fauna, however, the Scraptiidae comprises a small number of species which are somewhat of a challenge to identify correctly and this latest RES Handbook updates that part of Volume V Part 9 published in 1954 which was devoted to the genera *Scraptia* and *Anaspis*.

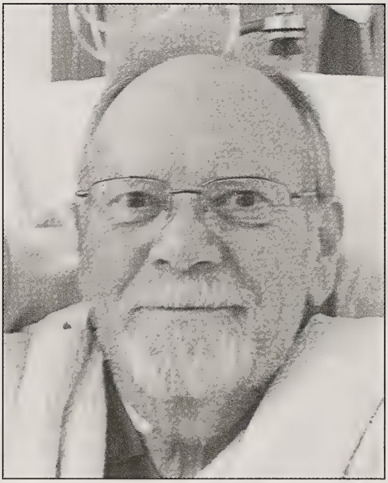
Three *Scraptia* species have been recorded in Britain, one of which is only known from a single record over 150 years ago and which may now be extinct, whilst the other two are very local and rare. With about 70 species of *Anaspis* found in Europe we should perhaps be grateful that only 13 have so far been recorded from Britain. Two of these are of doubtful status whilst a further species – *A.* (*Nassipa*) *flava* (L.) could occur here.

Following the usual introduction, brief larval notes and a systematic check list, pages 5–23 contain fully notated keys to all species accompanied with marginal explanatory diagrams to supplement the descriptive text. Published *Anaspis* keys rely substantially upon male sexual characters and these are repeated here. However a separate and very welcome key to identify the females is also provided. Brief notes on each species give information relating to the colour variations found within some species, to British/European distribution, abundance, adult phenology and larval hosts where known. The Handbook concludes with a bibliography of references, index and four representative excellent colour plates (although no accreditation appears to be given).

For reasons of continuity it would perhaps have been logical if Volume V Part 9 could have been updated and revised in its entirety thereby avoiding a fragmented proliferation of parts. However this small Handbook is a very welcome contribution to our knowledge and understanding of the smaller beetles and indispensible to any coleopterist with aspirations to accurately identify this group.

NORMAN HEAL

OBITUARY



GEOFFREY NORMAN BURTON BA, FRES
1940–2010

Geoff Burton was born in Polegate, East Sussex. He had always had a keen interest in entomology and eventually joined the British Entomological & Natural History Society in 1977. His interests flourished and he became Assistant Treasurer of the Society from 1985–1994. He ran a Rothamsted light-trap in his garden at Minster-on-Sea, Sheppey continuously from 1977 to 2009 and in so doing produced the most comprehensive set of Lepidoptera records in the island's history. These have proved an invaluable baseline for the Kent Lepidoptera Group who are currently compiling a county atlas.

Geoff studied modern languages at the University of Leeds, taking up a teaching post there in a secondary school following graduation. He then moved with his very young family to Sheppey in 1970 to become the Head of Languages at the opening of the Sheppey School as it was then called. He worked for the good of the school and its students, rising to Head of Faculty, then Deputy Head until his forced retirement on health grounds in 1989. During this time he formed and conducted the School Choir in conjunction with the Musical staff and raised the school's status across the island.

Geoff was a Francophile and took many opportunities to visit butterfly haunts on the continent; I recall some interesting visits to the French alpine meadows in 1980 where Geoff was particularly interested in *Erebia* species. He also enjoyed micro-photography. Outside entomology Geoff was well travelled and had a love of eastern culture, collecting netsukes and stringed instruments. He was a gifted musician (piano and woodwind instruments) and even built his own hurdy-gurdy. He also collected the works of the nineteenth century French artist Adolphe Appian. After his courageous survival from cancer for over 30 years Geoff will be sadly missed. He is survived by his wife Anne, their children, Judith and Mark, and five grandchildren.

JOHN FELTWELL

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Cover photograph: *Aleurochiton aceris* (Modeer) winter puparium on *Acer platanoides*. Photo: David Crossley, Crown copyright courtesy Fera.

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WISTERIA SCALE, *EULECANIUM EXCRESCENS* (HEMIPTERA: COCCIDAE) SPREADING IN SOUTH EAST ENGLAND

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Abstract

Information is given about the current distribution and host plants of wisteria scale, *Eulecanium excrescens* (Ferris), in Britain. It was first detected in a London garden in 2001 and has since spread within the Vice Counties of Hertfordshire, Middlesex, South Essex, Surrey and West Kent. It is recorded feeding on seven plant species belonging to seven families.

Introduction

The wisteria scale, *Eulecanium excrescens* (Ferris) (Hemiptera: Coccidae), a native of China, was first reported in Britain from central London in 2001, where it may have been present for at least three years (MacLeod & Matthews, 2005). By the end of 2003, it had been found in 13 private and one public garden in the greater London area (Malumphy, 2005). Between December 2003 and July 2010, 28 verifiable reports of *E. excrescens* were received by the Royal Horticultural Society (RHS) and the Food and Environment Research Agency (Fera), indicating that the scale is spreading in south-east England. Details of the distribution and host plants of these reports are presented here.

The globular, dark brown, mature adult females of *E. excrescens* can usually be distinguished from other Coccidae found in the UK by their large size, up to 13 mm long and 10 mm high (Fig. 1). A grey powdery wax resembling a growth of mould usually covers the scale, although this may be lost as they mature. The immature

Figure 1. Adult and immature wisteria scale *Eulecanium excrescens* on *Wisteria* sp., copyright RHS.

nymphs are pale brown with rectangular whitish encrustations on their surface. Both adults and nymphs occur on the stems and branches of the host plants. A detailed description is given in Malumphy (2005 and references therein). It is a highly polyphagous scale and has been found feeding on many deciduous orchard and ornamental trees in the USA, where it is also an established non-native species (Gill, 1988). Other scale insects likely to be found on *Wisteria* in Britain are brown scale, *Parthenolecanium corni* (Bouché) and nut scale *Eulecanium tiliae* (L.), neither of which is more than 7 mm in length.

Distribution in Britain

Most of the 28 verified reports of *E. excrescens* received since 2003 are from the greater London area, 23 within the Vice Counties of Surrey and Middlesex, and one report each from the Vice Counties of South Essex and West Kent (Fig. 2). This is

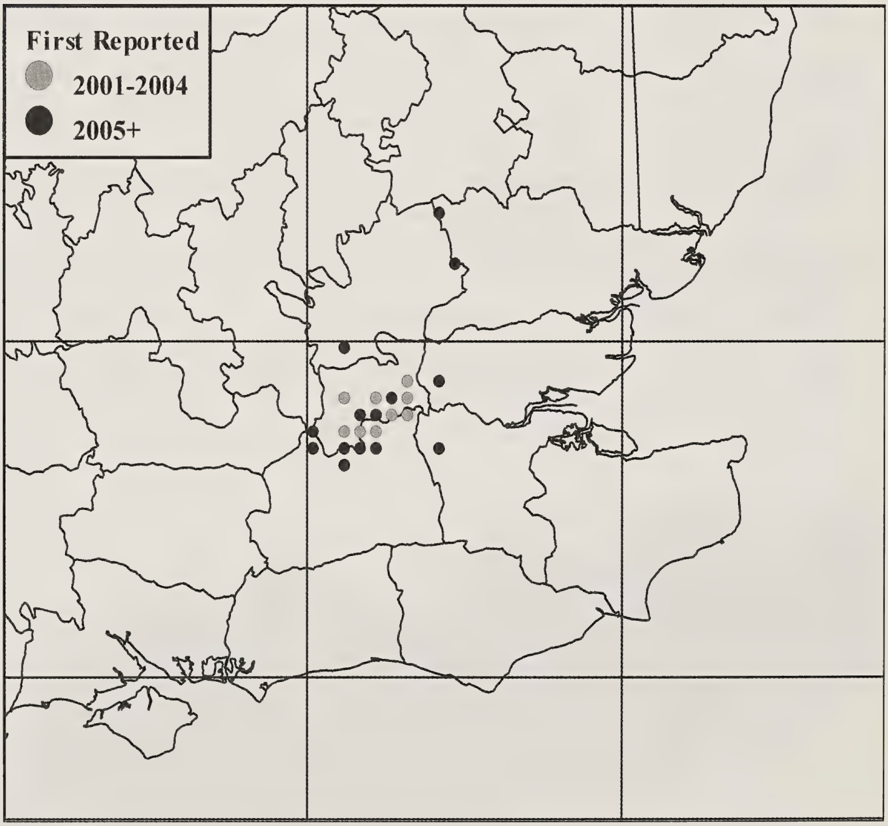

Figure 2. The distribution of wisteria scale *Eulecanium excrescens*, in south-east England based on a 5km grid (RHS and Fera data, May 2010), produced using DMAP. 2001 to 2003 records published in Malumphy (2005). These data will be made available via the National Biodiversity Network (*www.nbn.org.uk*) and the Royal Horticultural Society (*www.rhs.org.uk*).

evidence that the scale is established and probably dispersing naturally in the Greater London area. The first-instar nymphs are highly mobile and may be carried in air currents. Such aerial dispersal has been demonstrated in several coccid species (Washburn & Frankie, 1985: Barras, Jerie & Ward, 1994) and birds and animals have also been suggested as a means of dispersal (Stephens & Aylor, 1978), Outside Greater London, *E. excrescens* has been reported from three locations in Hertfordshire: Royston (TL43, July 2007), Bushey (TQ19, August 2007), and Bishops Stortford (TL42, February, 2010), confirming the hypothesis that this insect would be able to establish outside of London (Malumphy, 2005). How it reached these new areas is unknown, although it is likely that it will be spread over longer distances through the movement of infested plant material by gardeners or the horticultural trade.

Host range

In the USA, *E. excrescens* is considered highly polyphagous and has been recorded on a wide range of deciduous orchard and ornamental trees (Essig, 1958; Gill, 1988; Kosztarab, 1996). Some of the most economically important host plants in the UK are apple (*Malus* spp.), almond (*Prunus dulcis* (Mill.)), apricot (*Prunus armeniaca* L.), cherry (*Prunus* spp.), elm (*Ulmus* spp.), peach (*Prunus persica* (L.)), pear (*Pyrus communis* l.), sycamore (*Acer pseudoplatanus* L.), walnut (*Juglans regia* L.) and *Wisteria* spp. (Essig, 1958; Gill, 1988). To date, in the UK, it has been found on seven genera from seven plant families (Table 1). As more records are forthcoming, it can be expected that the host list in the UK will expand. In the vast majority of cases the host plant has been *Wisteria* and this is likely to be the preferred host, as it is in the USA (Gill, 1988). As yet there are no British reports of the scale being found on fruit trees in gardens or commercial orchards.

Discussion

Several of the most common coccids (soft scale insects) found outdoors in urban areas in southern England are non-native invasive species, for example, *Coccus hesperidum* L., *Pulvinaria floccifera* (Westwood) and *Pulvinaria regalis* Canard. The last species was first reported from Kew, London in 1964 (Harris, 1970; Malumphy,

Table 1. Reported host plants of wisteria scale, *Eulecanium excrescens*, in the UK, based on a total of 42 reports. The scale being present on more than one host in some locations. (RHS and Fera data).

Plant Family	Host	No. of reports
Rhamnaceae	Californian Lilac *Ceanothus* sp.	1
Bignoniaceae	Pink Trumpet Vine *Podranea ricasoliana* (Tanfani)	1
Rosaceae	*Prunus* sp.	1
Sapindaceae	Sycamore *Acer pseudoplatanus* L.	1
Vitaceae	Virginia Creeper *Parthenocissus quinquefolia* (L.)	1
	Boston ivy *Parthenocissus tricuspidata* (Siebold & Zucc.)	
Leguminosae	*Wisteria* sp.	39
	Wisteria sinensis (Sims)	1
Ulmaceae	*Zelkova* serrata (Thunb.)	1

1988) and within two decades it had spread throughout much of southern England reaching as far north as Chipping Norton, Oxfordshire (Speight & Nicol, 1985). It was first recorded in York in 1996 (Malumphy, 2009) and Glasgow in 2008 (Jeanne Robinson, 2010 *pers. comm.*). It is clear that *Eulecanium excrescens* is established in London and is spreading into adjacent counties. Records from Hertfordshire indicate that it could become widespread across southern England. It is possible that *E. excrescens*, like *Pulvinaria regalis*, will spread throughout much of southern England over the next few decades.

The impact of this pest in the UK remains unclear. The insect feeds on phloem sap and this can directly weaken plants. Heavy infestations can cause die-back on *Wisteria*. The scale also excretes excess plant sap as 'honeydew', which can encourage the growth of sooty moulds, having the secondary effect of reducing photosynthesis and the aesthetic quality of plants. When the host is *Wisteria*, it can directly affect the appearance of buildings swathed in this plant. The impact on commercial crops is less clear. It is considered a pest in China (Deng, 1985) but not in California where it is rare (Gill, 1988). None of the hosts on which it has been found in the UK so far are commercial orchard trees, although, as this insect spreads away from city gardens into fruit growing regions, it does pose a potential threat.

The Royal Horticultural Society is monitoring the spread of *E. excrescens*. Records with photographs or samples will be gratefully received at the e-mail or postal address above.

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HALOCLADIUS VARIABILIS (DIPTERA: CHIRONOMIDAE) IN SCOTLAND

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Abstract

The chironomid *Halocladius variabilis* (Staeger) is reported from rocky intertidal shores from both the east and west coasts of Scotland. Larvae of *H. variabilis* occurred on both sheltered and exposed shores in fully marine to estuarine conditions. Immature stages were found primarily in association with the epiphytic brown seaweed *Elachista fucicola* (Velley) Areschoug growing on *Fucus vesiculosus* L, athough other primary and secondary hosts were identified. Older records are reviewed to provide a general distribution of *H. variabilis* in the U.K. and the Republic of Ireland.

Introduction

Despite their abundance in terrestrial habitats, insects are generally not represented in marine environments where they are generally ignored by marine biologists (Cheng, 1976; Armitage, Cranson & Pinder, 1995). With 12–15 genera and about 50 species, the family Chironomidae is a major exception to the generalization that insects are poorly represented in marine environments. Chironomids have been recognized as abundant in estuarine, salt marsh, and marine habitats (Colman, 1939; Colbo, 1996; Williams & Williams, 1998; Goldfinch & Carman, 2000; Giberson, Bilyj & Burgess, 2001; Garbary, Jamieson & Taylor, 2009).

Among the most widely distributed of these chironomids is the Holarctic *Halocladius variabilis* (Staeger) whose populations can reach over 60,000 m^2 on the Atlantic coast of eastern Canada and nearly equivalent densities in the White Sea of Northern Russia (Garbary, Jamieson & Taylor, 2009; Tarakhovskaya & Garbary, 2009). Such numbers are considered superabundant using the SACFOR scale, an integrated system for recording abundances of benthic marine flora and fauna (Connor & Hiscock, 1996), and rank *H. variabilis* as the most abundant marine insect yet described. Larvae of *H. variabilis* are frequently found among the filaments of the epiphytic brown seaweed *Elachista fucicola* (Velley) Areschoug (Fig. 1) where they are presumed to feed mainly on diatoms growing on the free filaments of the host seaweed (Garbary *et al.*, 2005).

Chironomids are common in the U.K. in freshwater, estuarine and marine systems (e.g., Williams & Williams, 1998). Colman (1939) reported various dipteran life history stages (mostly larvae) [unidentified to genus but likely *Halocladius*] from the south coast of England associated with *Pelvetia canaliculata* (L.) Decaisne & Thuret, *Fucus spiralis* L., *F. vesiculosus* L., *F. serratus* L. and *Ascophyllum nodosum* (L.) Le Jolis. Larvae of *Halocladius variabilis* have been sporadically collected and reported from the British Isles and Ireland. The first records of *Halocladius* in Britain and Ireland included four species: *H. variabilis, H. varians* (Staeger), *H. fucicola* (Edwards), and *H. braunsi* (Goetghebuer) from littoral rock pools (Cranston & Hockin, 1981). A *Halocladius* species was found with *Ascophyllum* in North Wales (Jarvis & Seed, 1996). McAllen (1999) described *H. fucicola* from supra-littoral rock

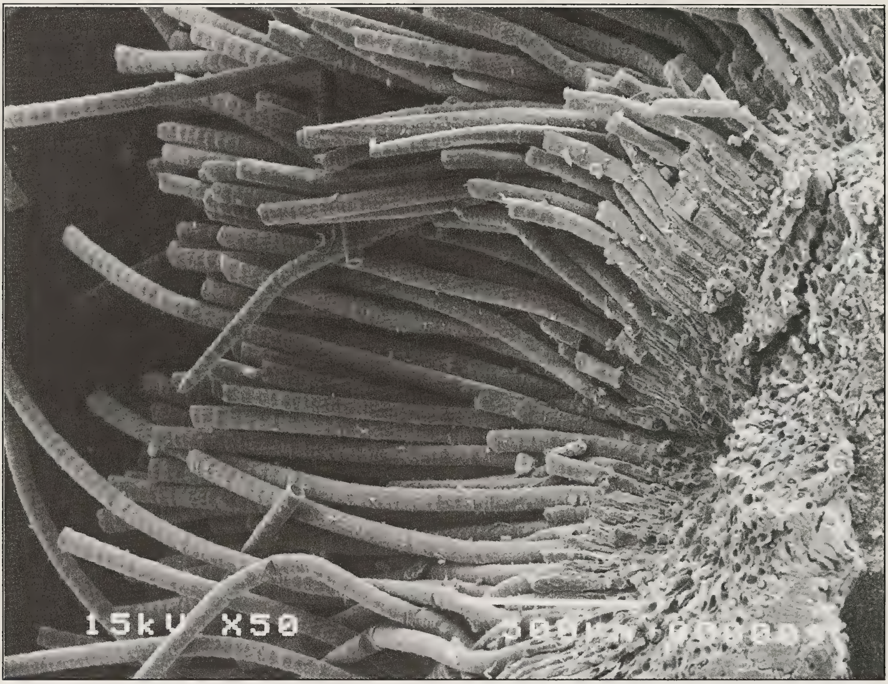

Fig. 1. Densely packed filaments of the brown seaweed *Elasticha fucicola*: a favoured habitat of the chironomid *Halocladius variabilis*. Note that the free filaments of *E. fucicola* would normally be 1–2cm long and those filaments on this specimen have been cut for ease of microscopy.

pools in Scotland. Preston and Moore (1989) reported *H. variabilis* from four rock pools on Great Cumbrae Island in the Firth of Clyde where populations occurred year round associated with the green alga *Cladophora albida* (Nees) Kützing. Laurence (1992) notes the presence of *H. variabilis* and *H. fucicola* larvae in supralittoral rock pools on various east and west islands of Orkney and later (Laurence, 1997) adults of these species in central and west mainland of Shetland and on the adjacent island of Unst. Kitching (1987) discussed the ecology of *H. variabilis* in the context of the flora and fauna associated with the fucoid, *Himanthalia elongata* (L.) Gray in Lough Hyne on the south coast of Ireland. *Halocladius variabilis* was also noted with Cyanophyta in Great Britain (Penzance) and Ireland (Sherkin Island) (Kronberg, 1988). Museum collections are limited. There is one mounted specimen of an adult *H. variabilis* in the World Museum Liverpool from Cheshire, and two adult mounted specimens in the Natural History Museum in London from Scotland collected by Peter Cranston and Frank Greenaway. Here we present new records for larvae of *H. variabilis* in Scotland in the context of their association with marine algae.

Methods

Shore visits were conducted at low tide. Each shore was examined for presence of large fucoids. *Elachista fucicola* on *F. vesiculosus* was the target host, however, if not present, other epiphytes of *Fucus spp.* or *A. nodosum* were collected, paying special

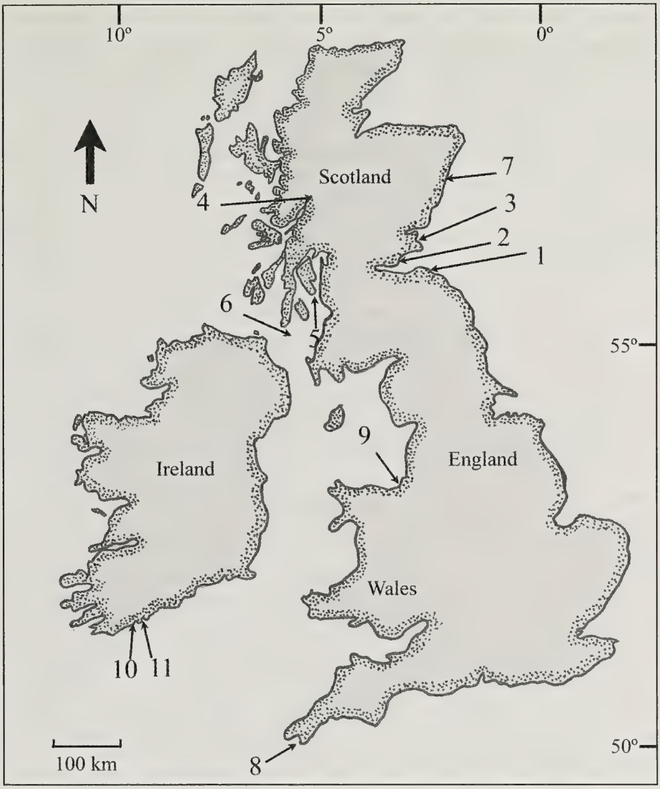

Fig. 2. Map of the United Kingdom and Ireland showing new locations for *Halocladius variabilis* (1–4) and previously published distributions (5–11). Note: previous collections from Shetland and Orkney Islands are not indicated (see Laurence, 1997). Sites: 1. Dunbar, 2. Aberdour, 3. St. Andrews, 4. Lettermore, 5. Great Cumbrae Island, 6. Ailsa Craig, 7. Grampian, 8. Penzance, 9. Cheshire, 10. Lough Hyne, 11. Sherkin Island.

attention to seaweeds with a tufted habit. At each sampling trip, three or four bags of seaweed were collected and examined within 24 h. Algae were placed into sorting trays and potential insect hosts were examined with a dissecting microscope, and algae were teased apart using forceps. The resulting specimens were preserved in 80% ethanol. While no adult flies were collected, the larvae were identified as *H. variabilis* based on larval morphology and ecology using Cranston's Key to the British Orthocladiinae (1982). Voucher specimens from all collections were deposited at the National Museums Liverpool.

Site descriptions

Sampling took place in Scotland (Fig. 2), in the intertidal zone of rocky shores on both sheltered and wave exposed sites between March and early June in 2010. Included were three sites on the east coast of Scotland and one on the west coast. Sites were chosen for ease of access to seashores, and for suspected presence of

E. fucicola using the Check-list and Atlas of the Seaweeds of Britain and Ireland (Hardy & Guiry, 2003). On the east coast, the rocky shores at Dunbar, Aberdour and St. Andrews were sampled and on the west Coast, Lettermore. Dunbar (56.01° N; 2.52° W), East Lothian, is located on the south-eastern coast of Scotland, facing the North Sea. It is near the mouth of the Firth of Forth, a large estuary in central Scotland. The shore at Dunbar is gently sloping and highly exposed, and the algae mainly occur on large boulders scattered over a fine sediment bottom with some pebbles. Aberdour, Co. Fife (56.05° N; 3.30° W), on the north shore of the Firth of Forth, is steep and sheltered, and composed of large bedrock with some sand and pebbles. St. Andrews, Co. Fife (56.33° N; 2.77° W), faces the North Sea. The rocky shore was relatively flat, and very wave exposed, with almost no *A. nodosum*. The shore is composed of large outcrops of bedrock with patches of sand and pebbles and several rock pools. Lettermore (Argyllshire, near Ballachulish, 56.69° N; 5.20° W), on the sea loch Linnhe is very sheltered, composed of bedrock and shingle, and is covered in *A. nodosum*. Some common fucoids were also present: *F. vesiculosus, F. spiralis, F. serratus, P. canaliculata* and *Himanthalia elongata*. Three other sites were visited on the Isle of Mull: Bunessan, PennyGale and Fishnish.

Results

Larvae of *Halocladius variabilis* were found on sheltered to wave exposed rocky shores on both coasts of Scotland (Fig. 2). Larvae were from 2–8 mm long and pupae were ca. 10 mm. At Dunbar two large larvae were found in amongst separate clumps of the red alga *Aglaothamnion tripinnatum* (Agardh) Feldmann-Mazoyer. The epiphyte *Elachista fucicola* was not found here, and this might reflect seasonality of the alga. *Halocladius variabilis* was next found at Aberdour in early May. One large and four small larvae were found in amongst *Ectocarpus fasciculatus* Harvey, a brown epiphyte on *Ascophyllum nodosum*. In amongst both non-*Elachista* hosts, the larvae were rare. *Halocladius variabilis* was first found in *E. fucicola* on *F. vesiculosus* at Lettermore on Loch Linnhe. Five larvae occurred in amongst the four host thalli sampled. *Halocladius variabilis* was next found in *E. fucicola* on *F. vesiculosus* at St. Andrews. Five larvae were found in close association with the first four thalli of *E. fucicola* that were sampled. Over 80% of the *E. fucicola* thalli had associated larvae. Pupae were found only in amongst *E. fucicola*. Visits to the three sites on the Isle of Mull failed to reveal the presence of the seaweed host *E. fucicola* or *H. variabilis*.

Discussion

The results of the survey confirm the presence of *H. variabilis* on both the east and west coasts of Scotland. They also confirm that the predominant host of *H. variabilis* is the brown epiphytic seaweed, *E. fucicola*. While the larvae of *H. variabilis* occurred in hosts other than *E. fucicola* (e.g.. the filamentous red alga, *Aglaothamnion tripinnatum*), these were typically present as single individuals, whereas multiple larvae were often present in *E. fucicola* as described for eastern Canada (Garbary *et al.* 2005, 2009) and the White Sea (Tarakhovskaya & Garbary, 2009). Tarakhovskaya and Garbary (2009) argued that hosts other than *E. fucicola*, especially those in the subtidal zone (see Santhakumaran, Sneli & Sundnes, 1984), resulted from larval dispersal from a non-submerged intertidal population rather than being derived directly from egg masses deposited by adults. Recent experiments show that while larvae may not select one host over another, that *E. fucicola* provides better protection from predators than some other hosts (Norah Brown, unpublished

observations). The rock pool populations of *H. variabilis* associated with *C. albida* (Preston & Moore, 1989) may have a similar origin of dispersed larvae. The prevalence of larvae in *E. fucicola* and the occurrence of pupae in *E. fucicola* suggest that it is the insect's main host on marine rocky shores. This is similar to previous results from eastern Canada and the White Sea (Garbary *et al.,* 2005, 2009; Tarakhovskaya & Garbary, 2009). The presence of *H. variabilis* without *E. fucicola* at Aberdour is interesting because it indicates that the insect occurs further up the estuary than *E. fucicola.* This raises the possibility of longer dispersal via tides, or the occurrence of alternative hosts in which adults will deposit egg masses. The insect is certainly abundant (SACFOR) in Scotland and may be superabundant if a more thorough investigation were undertaken.

Acknowledgements

The authors thank Martin Wilkinson for his help in algal identification, and Guy Knight and Kim Goodyear for museum records from the National Museums Liverpool and the Natural History Museum (London), respectively. Louise Milne, Kerry McDonald and Jayne Burns provided assistance in the field. This work was funded by grants from Natural Sciences and Engineering Research Council of Canada (NSERC) to DJG and an NSERC undergraduate scholarship to NEB.

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SHORT COMMUNICATION

Decline of *Prokelisia marginata* (Van Duzee) (Hemiptera: Delphacidae) in Kent 2010. – The discovery of large numbers of the introduced North American planthopper along the north Kent salt marshes was reported in 2009 (Badmin & Witts, *Brit. J. Ent. & Nat Hist.* **22**: 213–215). In view of the species recent establishment and the large numbers present on several saltmarshes it was confidently predicted numbers would be even higher in 2010, possibly high enough to cause 'hopper-burn' like symptoms similar to those induced by related pest planthoppers. The prediction looked on track when individuals were swept from *Spartina* patches along Oare Creek, Faversham in early January 2010. Soon after, Kent experienced its longest spell of cold weather for 30 years. Summer population levels of *P. marginata* at three Kent sites were approximately 60–80% lower than those recorded in 2009 and it is tempting to link this decline with the extreme weather conditions experienced earlier in the year. The planthopper, however, occurs along the coastline of North America where it is likely to experience equally cold winters on a more regular basis and so the bad winter itself may not be the main causal factor linked to the species present decline. Two explanations are offered: (i) the phenotype of *P. marginata* present in Europe may have originated from a southerly part of its range in North America and thus not be well adapted to cold weather, and (ii) the planthopper may be adapting to new habitat in the UK by reverting from a migratory form to a more sedentary, more fecund ecotype which is less cold-adapted. Of course an equally plausible explanation is that final generation numbers in 2010 were lower simply as a result of lower summer temperatures and shorter development season. – JOHN BADMIN, Coppice Place, Selling, Kent ME13 9RP.

ZYGINA NIVEA (HEMIPTERA: CICADELLIDAE) NEW TO BRITAIN

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ABSTRACT

The leafhopper *Zygina nivea* Mulsant & Rey (Cicadellidae: Typhlocybinae) is reported from a number of sites in the London area. These records represent the first for the British Isles.

INTRODUCTION

During a visit to London in February 2010, JB collected an unfamiliar typhlocybine leafhopper from ivy, *Hedera helix* at Margravine Cemetery, Hammersmith (VC21). Although the specimen appeared uniformly whitish-yellow in the field, close examination revealed a small red spot on the vertex and a pair of even smaller red spots on the scutellum. The wing venation indicated a member of the Erythroneurini and he soon realised that these features were consistent with *Zygina nivea* Mulsant & Rey, a species found throughout much of continental Europe on white poplar *Populus alba* (Biedermann & Niedringhaus, 2009). Leafhoppers in this genus frequently spend the winter as adults and as is usually the case with over-wintered individuals, the specimen was a female.

The second example of *Z. nivea* was found by SB during a London Natural History Society field meeting in the Richmond-Ham area (VC17) on 17 April. The specimen was swept from scrub below *P. alba* by the Thames riverside; it was identical in appearance to the first and was also a female.

On September 30, TB swept large numbers of *Z. nivea* from a stand of suckering *P. alba* in Alexandra Park (VC17), together with *Viridicerus ustulatus* (Mulsant & Rey) and *Edwardsiana candidula* (Kirschbaum). Both sexes were present and a number of different colour morphs were noted; these are detailed below.

DESCRIPTION

Length: ♂♀: 3.3–3.7mm. A large *Zygina* species and noticeably bigger and more cream-coloured in the field than *E. candidula*. The extent of the red markings was variable in the Alexandra Park population and at least three colour forms were observed. The vast majority of individuals were either marked with a small red spot just behind the apex of the vertex, with two smaller red marks near the corners of the scutellum, along the boundary between the scutellum and clavus (Fig. 1b), or were completely devoid of red markings (Fig. 1c). These forms are referred to by Ribaut as *var. punctulum* and *f. typica*, respectively (Ribaut, 1936). Only three examples were noted in which the red markings were much more extensive, with a wide band covering the central area of the vertex and pronotum (Fig. 1a, Fig. 2); this form is described as *var. cruoris* (Ribaut, 1936). A characteristic feature of *Z. nivea* is the dark ventral surface of the mesothorax, which is largely blackish.

Identification was confirmed with reference to the male genitalia. The form of the aedeagus is rather unlike the other British *Zygina* species and is much more elongate, slightly hooked and does not narrow towards the apex (Fig. 1d).

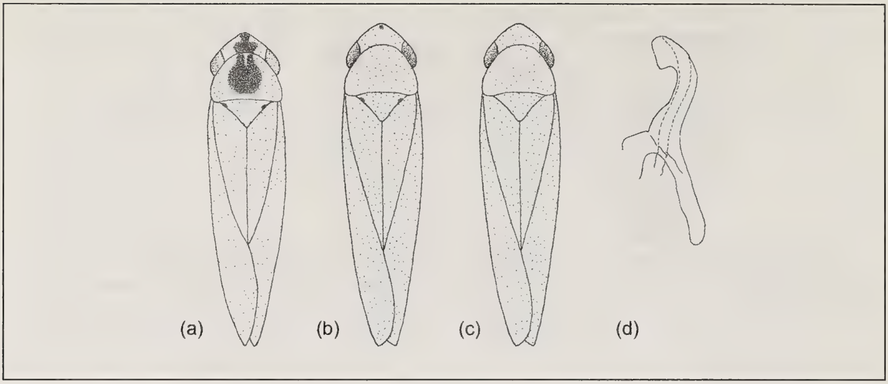

Fig. 1. Colour forms of *Zygina nivea* (a, b, c) and lateral view of aedeagus (d), after Biedermann & Niedringhaus (2009).

Fig. 2. *Zygina nivea* f. *cruoris*, Alexandra Park, London, 30 September 2010. Photo: T. Bantock.

Distribution

Zygina nivea is known from much of central Europe including Spain, France and Germany. In Germany it has expanded its range northwards in recent years (H. Nickel, *pers. comm.*), perhaps explaining its recent appearance in Britain. At present the distribution of *Z. nivea* in the UK appears to be confined to London, but it should be looked for in neighbouring vice counties in the South-East. In France it has also been recorded from *Populus nigra* (s.l.), *Salix alba* and *Salix elaeagnos* (Nickel, 2003).

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THE 2010 PRESIDENTIAL ADDRESS – PART 2 SUCCESSFUL TECHNIQUES FOR BREEDING THE SMALLER MICROLEPIDOPTERA

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Introduction

In considering a topic like this it might be best to give a bit of historical background to the subject.

I like to think that the father of microlepidopterology in the British Isles – if I can coin such a term, was Henry Tibbats Stainton who lived from 1822 to 1892. In the world of entomology, being well educated, fluent in German, French and Latin and of independent means, gave him a unique insight into the study. His output of publications and editorships over his lifetime was prodigious and of special interest to the microlepidopterist was his monumental *Natural History of the Tineina* which appeared in thirteen volumes over an 18 year period (Stainton, 1855–1873). It is still very useful today.

Now, he was a contemporary of Philipp Christoph Zeller (1808–1883) who might be described as a "German" Stainton and who joined in the production of this natural history of the "Tineina" and indeed, he may well in the end have been the major author. Also involved in this work as a junior author was John William Douglas a contemporary and friend of Stainton who was sufficiently expert in the Gelechiidae to qualify to assist. There were other collaborators too going as far afield as Austria where Heinrich Frey (1822–1890) contributed.

Stainton himself must have been a skilled breeder of microlepidoptera since, for instance, he was well aware of the difficulties attending the breeding of such a difficult species as the gelechiid *Monochroa arundinetella* (Stainton). Regrettably, he left little information about the methods he used, confining himself largely to descriptions and biology of species. He did however produce a small "*Entomologist's Companion*" (Stainton, 1852) and in it, devoted three brief, really uninformative paragraphs to the subject of breeding microlepidoptera.

Before I leave this fascinating person whose life is well documented by Salmon (2000), it is interesting to note that Stainton himself described some 110 species on the British List whose names still stand as well as a number of synonymised species in the literature. Zeller himself is responsible for some 160 species names on our list and Douglas himself, for about 40.

The next great microlepidopterist was Thomas de Grey, Lord Walsingham (1843–1919). He had the means and the fortune to garner a massive collection of microlepidoptera, which along with Zeller's collection which he purchased and other similar material containing many types was deposited in the British Museum of Natural History (BMNH). He bred many species for the first time, but did not enlighten us about his methods. He did produce a rare pamphlet giving instructions about collecting micros, but regrettably had little to say about rearing methods, (Walsingham, 1872).

Tutt's Practical Hints first began to appear in 1901 and at last this offered some expertise with the problem of breeding the smaller moths (Tutt, 1901–1905), but after this Richard South's series of famous and standard books, so useful in my youth brought about a regrettable dichotomy in the British lepidoptera . . . micro-

lepidoptera and macrolepidoptera (South, 1907–1908). After this, interest in the former declined, but in 1949, an important ground breaking publication appeared. It was "*A Guide to the Smaller British Lepidoptera*" by L. T. Ford (1949). The format was somewhat akin to Scorer's (macrolepidoptera) *Log Book* (Scorer, 1913), sticking to key facts about an insect's phenology and biology. In its updated second edition, the *Guide* is now being reprinted by our Society to satisfy demand. Its editorship in the second edition was in the safe hands of Lt. Col. A. M. Emmet and the Society is now considering a completely new edition.

Members of the Amateur Entomologist's Society also have a useful publication to consult by Paul Sokoloff (1980). Colonel Emmet was also involved in another work of importance to this topic at this time which was a publication entitled "*Breeding Butterflies and Moths*". The author was Ekkehard Friedrich (1986) and was translated from the original German by Steven Whitbread and published by Harley Books in *The Moths and Butterflies of Great Britain and Ireland* (MBGBI) format. Colonel Emmet's contribution was to provide a mostly new 20-page section on rearing the microlepidoptera.

Now, to the present day. It was Maitland Emmet (1976) who gave the best instruction on the subject of breeding endophagous microlepidoptera (i.e. those species that feed and develop internally in plants) in MBGBI Vol. 1. He, like me had initially been disappointed by the results from advice such as wrapping mines in tissue paper for pupation in plastic boxes. This is a guaranteed way to fail for many species since such paper is hygroscopic and desiccates the insects. (A bed of nylon is a better way for storing pupae in plastic boxes).

There is now no shortage of literature about microlepidoptera to give an idea about a species' biology so I can now get down to the "meat" of the subject. This is an attempt on my part to refine and update Maitland Emmet's techniques. Though my remarks are directed primarily at the endophytic superfamilies, especially the Nepticuloidea, they can be modified to apply to all the smaller moths or even the larger ones for that matter.

First, not the favourite pastime of an entomologist is the necessity to go shopping to obtain the paraphernalia required to start the system. A first stop at the supermarket or other outlet should start at the dairy produce where scrutiny of the shelves should reveal 450g yoghurt pots with clear bodies, a removable label and a clear resealable top. The one I prefer to use is the "Yeo Valley" brand. Another brand is "Rachel's" though this one does not have clear sides. After enjoying the contents, the pot should be washed in warm water (but not cleaned in a dishwasher, because it will distort) and placed to one side with the clear top. One pot a week will produce over 50 pots in a year. A second stop should be made at the bread counter, where scrutiny of the bread wrappers will reveal that many are punctured with a myriad of small holes. After purchase of a suitable loaf the wrapper can be carefully opened at one end and then put to one side. Now the exciting bit; a visit to a lingerie department is required to obtain some tights (and of course make sure – if appropriate- you get hold of your partner's/wife's cast offs). I recommend the 15 denier black variety which gives them a reasonably good durability and when stretched over a pot, gives a good view inside. Visibility is far better with black than tan-coloured types the reason for this I know not.

The pots will now require preparing. The first act should be to puncture the bottom with plenty of holes to secure good drainage. This can be done *en masse* using a heated skewer and stacking the inverted pot and pushing the skewer through. Next a sequence of fillers is necessary. First place two or three centimetres of pea gravel in the bottom, then three or four centimetres of moss peat mixed with a little

sea or sharp sand to ensure satisfactory drainage. (Some people may have issues with the use of moss peat, but I have been using the same bag of Irish moss peat for many years). Next, sprinkle the surface with some of the pea gravel used for drainage to offer a pupating larva a choice of substrates. The pot is now ready for use except for one important ingredient, which is denatured sphagnum moss. This can be obtained by gathering a bag of sphagnum, tying it in a plastic bag and putting it on one side for a month or two in a dark place.

When the time comes to use a pot, some of the denatured sphagnum can be then placed in the pot after wetting it and squeezing out excess moisture. (It may already be wet in the storage bag). If they are leaf miners, then the moisture in the sphagnum will keep the larvae in the leaves viable until pupation or evacuation of the mine. It is important not to pack the sphagnum down too tightly. If this is done, then over a long period, especially during the winter, the material will coalesce to form a solid cake and hinder eclosion. It is then a matter of snapping the clear plastic lid over the pot (Plate 13, Fig. 1) and writing upon the side of the pot, the identity of its contents. Inscriptions using a garden marker pen will not deteriorate over the winter if one is used.

For usage, the leaves containing larvae are placed in the pot over the damp sphagnum and kept somewhere at a reasonably constant temperature to minimise condensation of moisture on the sides of the container. There is the odd important exception: some species of Nepticulidae particularly the *Fagus* feeders, require the detritus that occurs under beech trees to pupate satisfactorily, substituting this material in the pot for the moss peat. I have also found that *Crataegus* feeders benefit from use of detritus under their trees. The leaves can be checked daily and removed when the larva has vacated the mine. It is important to remember to examine the leaves upon removal in case any larvae have pupated on the host plant. This is a common occurrence with the *aurella* group of Nepticulidae. Almost all "neps" will descend to pupate, but importantly, *Rosa* feeders will often go upwards, and pupate up on the lid or on the leaf they have recently vacated.

After removal of the leaves from the pot, it is a good idea to preserve a sample for future reference. They can be placed in photograph albums or the first day cover books sold by philatelist dealers.

Should the pot not be big enough to accommodate large leaves or even larger species, then recourse can be made to larger pots obtainable at garden centres. Stewart plastics make a good one. These are 170mm diameter (6.5″) and can be adequately sealed with sheet glass cut to 7″) with the glass resting on top. It is of course possible to use even larger plastic tubs with a larger sheet of glass to cover.

Overwintering and emergence

We have the pots, we have the pupated or cocooned larvae, so now the question of their subsequent treatment has to be considered .The first action should be to consult an appropriate publication on life histories to give a clue as to whether the occupant is going to overwinter or not. If not going over-winter, then simply placing the pots outside with a degree of shelter should be alright. Otherwise it will be necessary to get the pots in as natural a condition as possible for the coming diapause. The first step is to remove the plastic snap-on lid, envelop the top of the pot with a cut off toe from a nylon stocking or tights and secure if necessary with an elastic band. (The rest of the tights of course can be used for pulling over larger tubs.) The pot should then be placed out in the open in a north facing situation, for example in my case, I place on shelving under a hedge (Plate 13, Fig. 2). Emmet (1988) recommended burying the

pots up to their necks in the ground, but this is not necessary and causes the pots to become messy and stained and the contents difficult to observe.

When spring is imminent, for example, early April in the south of England, the pots need to be dried out a bit, so they should be removed from their winter position and placed under shelter away from the rain to start drying out (Plate 14, Fig. 1). After a fortnight or so, it should be possible to remove the nylon and replace with the clear plastic snap-on lids which have been put to one side and await emergence. Some will stubbornly develop moisture on their walls all the time, so in that case it is necessary to use a hot pin to punch a few tiny holes in the lid to aid ventilation or revert back to the nylon toe.

The Nepticulidae usually emerge fairly early in the morning and slowly progress up the sides of the pot as they dry their wings and start to become very active in the mid afternoon. They will normally run round the rim of the pot and are easily seen.

Forcing species

It is not a good idea to force emergence of the Nepticulidae or the Heliozelidae, but it is alright to do so with the Eriocranioidea. and the Gracillarioidea. Generally, I tend not to force species of other families unless they are double brooded. If one has emerged, then it is generally safe to bring the pot into the warmth.

Returning to the Heliozelidae, they are a very difficult group to breed and it is probably best to leave them as long as possible before picking the mines, preferably just before they are about to make a case. For example, *Heliozela resplendella* (Stainton) on alder needs to be picked almost as it begins to cut its case in order to achieve success and then treated like a nepticulid. Larvae of this group make a case to overwinter in and for preference like to attach this to a twig or cut stem, so something like this should be added to the pot.

Now some examples of specialised problems (case studies).

Case feeders

It is essential that the case-bearing Coleophoridae be given as much open air as possible, particularly if they are being overwintered and require ideally, a very large tub with the foodplant in a pot of water in the middle and preferably with the plant touching the nylon cover to enable the larvae to make what I can only describe as choices for fixing for overwintering. They should not be disturbed in the spring since they normally hibernate as larvae and frequently move around again in the spring. It is not uncommon for coleophorid larvae to go over for another year and I have a record of *Coleophora tricolor* Walsingham that feeds initially on basil thyme *Calamintha acinos* going over for a third year. For this species, it may well be a strategy for coping with a foodplant that is fickle in its appearance.

The same does not seem to apply to the case-bearing Tineidae which are happy in any environment and flourish satisfactorily in plastic boxes.

Galls

Breeding species such as the momphid *Mompha bradleyi* Riedl which forms a larval gall on great willowherb *Epilobium hirsutum* can cause difficulties and these can be overcome by recourse to the perforated bread wrapper mentioned earlier (Plate 14, Fig. 2). The galled plants can be placed in water with a suitable stopping at the necks of the cut stems and the perforations in the wrapper will give just about the

right atmosphere for the moths to complete their life cycle without the plant dying or mould killing the pupae. Similarly, larvae of the tortricid *Acleris lorquinana* (Duponchel) can easily be bred on purple-loosestrife *Lythrum salicaria* using this method, as cut material from this food plant is notorious for quickly growing mouldy. Another gall feeder, *Cydia milleniana* (Adamczewski) has a special problem which applies to all larvae which feed on woody stems. They require as much air circulation around them as possible so they should be kept in the tops of the tubs as shown (Plate 15, Fig. 1) and fully exposed to "a' the airts-o-heaven" as P. B. M. Allan used to say in his highly readable book (Allan, 1943) which is well worth referring to for breeding the macrolepidoptera, particularly his method of overwintering pupae.

Wood and fungus feeders and birds' nests

Species that feed either on wood, fungi or birds' nests detritus require larger containers and will do very well in washing-up bowls with nylon tights pulled over. If they have been under shelter for a long period then the nylon can be replaced by a glass lid. With regard to birds' nests, they look innocent enough until late autumn when the fleas which have pupated in the nest material start to appear. If they are not required for study, then they are best disposed of by picking a cool day when they are torpid and brushing them out . . . somewhere away from your property otherwise, you may be a victim of casual feeding. This will have to be repeated a few times through the winter until spring.

Larvae making cocoons in wood

Larvae such as the tortricid *Pammene gallicana* (Guenée) have the problem that they will chew through the nylon covering. These are best kept in a very large tub plus overlying large glass lid with the usual substrate and with the addition of a cut down inverted yoghurt pot which can sit in the middle so that the plant, in a container the other way up, can be removed with minimal disturbance. The sides of the tub can then be packed with some rotten wood or virgin cork which is sold by florists and is excellent for the purpose (Plate 15, Fig. 2). The oversized tub will minimise the mould problem and the glass sheet can be moved over if the larvae start chewing through the enclosing nylon. It is a good idea not to dry out these tubs or pots too much, but to leave them in a shady place exposed to moisture so that any cocoons do not become too dry and hardened making it difficult for the imagines to emerge.

Disposal of the pots

All the materials I have mentioned should be disposed of after use in the pots. The detritophagous oecophorids *Endrosis sarcitrella* (L.) and *Hoffmanophila pseudospretella* (Stainton) show great ingenuity in invading the pots and tubs and interfering with the contents. The pots themselves can be washed and re-used. If virgin cork has been used as a pupating medium, it can be sterilised by heating and also re-used repeatedly.

Other orders

Though the title is directed exclusively at Lepidoptera with the emphasis on microlepidoptera it is worth mentioning that species in other Orders have similar lifestyles and the same techniques can be applied for successfully breeding them. For

example, the larval mines of agromyzid flies are frequently seen in the same situations as those of microlepidoptera and would be very suitable for this kind of treatment. In the RES Series, *Handbooks for the Identification of British Insects: Agromyzidae* (Spencer, 1972), brief reference is made to breeding methods and I think they would be ideal subjects.

Conclusions

I hope that this paper has provided some ideas on the techniques for successfully breeding the smaller Lepidoptera, using easily available modern materials, not only for records, but for obtaining a more complete understanding of the life histories of these fascinating creatures. Using the techniques that I have described, there is no reason why if the larvae are viable that breeding results approaching 100% cannot be obtained.

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SCALE INSECTS AND WHITEFLIES (HEMIPTERA: COCCOIDEA AND ALEYRODOIDEA) OF BEDFORDSHIRE

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Abstract

This is the first account of the scale insects and whiteflies (Hemiptera: Coccoidea and Aleyrodoidea) of Bedfordshire, based primarily on samples collected by the author and records obtained from the Royal Horticultural Society. Collection details for 34 species of scale insect (27 native and naturalised species, seven introduced species established on indoor plantings) and eight species of whitefly (six native and naturalized, two introduced species established on indoor plantings) are provided.

Introduction

National and regional checklists are essential as baseline data from which faunistic changes due to factors such as climate change and international trade can be monitored and accurately assessed. The purpose of this communication is to record the scale insects and whiteflies (Hemiptera: Coccoidea and Aleyrodoidea) found in Bedfordshire (Watsonian Vice County 30), based primarily on samples collected by the author and unpublished records obtained from the Royal Horticultural Society (RHS). The latter records are mostly based on samples submitted by RHS members to the RHS Advisory Services for identification. A small number of samples were collected by the Plant Health and Seeds Inspectorate (PHSI) of Defra during statutory plant health inspections at commercial nurseries, and a few records were received in response to an illustrated article on the scale insects of Bedfordshire posted on the Bedfordshire Natural History Society (BHNS) website in June 2009 (*http://www.bnhs.org.uk/*).

Prior to the 1990s there appear to have been no scale insects specifically recorded from Bedfordshire in the extensive and disparate literature on British Coccoidea (the main authors being J.W. Douglas who published British records between 1881–1895, R. Newstead 1889–1904, E. E. Green 1895–1934, K. L. Boratynski 1951–1982 and D. J. Williams 1962–1997. At the time of publication complete bibliographies were available online on ScaleNet, *http://www.sel.barc.usda.gov/scalenet/scalenet.htm*). Since the 1990s some brief notes on the scale insects of Bedfordshire have appeared in the newsletter of the BNHS *Muntjac* (Baker & Baker, 1991; Malumphy, 1992, 1993, 2009c, 2010b). However, only records of two species found in Bedfordshire have been published in more widely available journals: *Asterodiaspis quercicola* (Bouché) (Malumphy, 2009d) and *Physokermes hemicryphus* (Dalman) (Malumphy, 2009a). Apart from two brief notes on whiteflies in Bedfordshire in the *Muntjac* (Malumphy, 1992, 2010b), there appears to be no specific references to whiteflies present in the county in the literature on British Aleyrodidae. Trehan (1940) and Mound (1966) reviewed the early literature of British whiteflies; recent works recording species new to Britain include Dolling & Martin (1985), Bink-Moenen (1989) and Malumphy (2003, 2005b).

Compiling the current list of the scale insects and whiteflies of Bedfordshire has been complicated by the fact that these are among the arthropod groups most commonly dispersed between countries as a consequence of international trade

(Malumphy, 2007); and non-native species of scale insect and whitefly are continually being accidentally introduced to Bedfordshire (and most other counties in Britain) on imported plant material. Scale insects are one of the most successful arthropod groups in terms of invading new geographical areas (Pellizzari & Dalla Montá, 1997; Thomas, 2004; Smith *et al.*, 2005) and many species have become cosmopolitan due to anthropogenic activities. Previous British checklists of scale insects (Boratyñski & Williams, 1964) and whiteflies (Mound, 1966) have included all species found in association with imported plant material. Non-native species found only on imported produce, however, are excluded from this work as they are unlikely to survive for long and their inclusion has little scientific value. Large numbers of species of both scale insects and whiteflies have been found on imported citrus, custard apple, guava, mango and pineapple fruit in England (including Bedfordshire) and Wales by the Plant Health and Seeds Inspectorate.

Methods

Collecting was carried out by searching visually in the field. Apical twigs and bark were also collected randomly and examined under a low power microscope in order to find cryptic scale insect species, for example *Asterodiaspis* spp. that occur on oaks and *Diaspidiotus* spp. that occur on apple, heather, oaks, pear and plum. Collecting scale insects was possible throughout the winter, as the post-reproductive adults of many species (particularly the Coccidae and Diaspididae) remain attached to the host plant long after they have died, in some cases for more than a year. Adult whiteflies of the genus *Aleyrodes* spp. may also be found throughout the winter, particularly on brassica and bramble plants in sheltered situations. Puparia of other whitefly species may be found on fallen leaves throughout the winter.

All samples listed under ‘Collection data’ were collected and identified by the author unless stated otherwise. Scale insect specimens were slide-mounted according to the methods described by Malumphy (2002) and identified using the diagnostic keys provided by Kosztarab & Kozár (1987) and Williams & Watson (1988a, 1988b, 1990). Whitefly specimens were slide mounted according to methods given by Martin (1987) and identified using the diagnostic keys provided by Mound (1966) and Martin, Misfud & Rapisarda (2000). Slide-mounted specimens are deposited at The Food and Environment Research Agency (FERA). The nomenclature of the scale insects used here follows Ben-Dov, Miller & Gibson (2009) and of the whiteflies Martin & Mound (2007).

Results

A total of 34 scale insect species (20 native, seven naturalised introductions, seven introduced species established on indoor plantings) and eight whitefly species (three native, three naturalised introductions, two introduced species established on indoor plantings) are recorded here for Bedfordshire. Examples of these species are shown on Plate 16. The scale insect and whitefly species have each been divided into two sections: native and introduced species that have become naturalized (they overwinter outdoors); non-native species found breeding under artificial conditions, e.g. on indoor plantings, which are likely to be present in Britain for the foreseeable future.

COCCOIDEA – Scale insects

NATIVE AND INTRODUCED NATURALIZED SPECIES

ORTHEZIIDAE – ensign scales

Newsteadia floccosa (De Geer) – boreal ensign scale (Plate 16, Fig. 2)

A Palaearctic, woodland species that occurs in damp habitats. It is found among mosses or lichens and leaf litter, or on the roots of a wide range of herbaceous and woody plants. It has been rarely recorded in Britain.

Collection data: Rushmere, Heath Wood (SP915274), adult females with ovisacs and nymphs on the roots of mosses, sedges and birch, 16.viii.2009.

PSEUDOCOCCIDAE – mealybugs

Phenacoccus aceris (Signoret) – polyphagous tree mealybug

A Holarctic species that is polyphagous on trees and shrubs. It occurs widely and is locally common in Britain.

Collection data: Coopers Hill (TL027378), abundant on *Fagus sylvatica*, up to 20 ovisacs on each tree, 4.vii.2010; Dunstable Downs (TL006198), on *Crataegus* sp., 1.v.1993; Luton, Stockwood Park (TL085202), dead females and ovisacs on *F. sylvatica*, 30.vi.1994; Luton Hoo, near Lake (TL116186), parasitized dead females and ovisacs with eggs on *Acer pseudoplatanus*, 19.vi.1994; Rushmere, Heath Wood (SP911273), sparse on *Crataegus monogyna*, 16.viii.2009; Sandy RSPB Reserve (TL188477), sparse, dead females with ovisacs on *Hedera helix*, 2.vii.1994; Toddington (TL006291), sparse on *A. pseudoplatanus*, 16.viii.2009; Woburn (SP948333), abundant, ovisacs on *Tilia cordata*, 16.viii.2009; Westoning church (TL028328), single ovisac on *Sorbus aucuparia*, 4.vii.2010.

Balanococcus diminutus (Leonardi) – phormium mealybug

Syn. *Trionymus diminutus* (Leonardi)

This species originates from New Zealand and was introduced to England in the 1970s (Bartlett, 1981). It has naturalized widely in England and Wales on *Phormium tenax* and is occasionally a serious pest, killing susceptible plants.

Collection data: Maulden church (TL058381), dead adults and large amounts of waxy deposits at the base of leaves on a small *Phormium tenax*, 4.vii.2010.

COCCIDAE – soft scales

In addition to the 13 species listed below, two first instar coccids were collected from grass at Dallow Downs, Luton (TL073215), 23.vii.1994. There are several grass and sedge feeding coccids present in the UK. The most common species are assigned to the genera *Eriopeltis* spp. and *Luzulaspis* spp., although it is possible that they were incidental (i.e., they do not feed on grass).

Coccus hesperidum L. – brown soft scale

A cosmopolitan, broadly polyphagous species. It is commonly recorded on indoor plantings in Britain but is also widely naturalized on evergreen plants, mainly in urban areas on *Hedera helix, Ilex aquifolium* and *Laurus nobilis*. The RHS has records of *C. hesperidum* from Bedford, on *C. sinensis*, 15.ix.2006; Biggleswade, on *L. nobilis*, 28.ii.1966; Dunstable, on *Citrus sinensis*, 21.viii.1980, *Ficus* sp., 26.ix.1995 and *L. nobilis*, 3.ii.2003; Keysoe, on *Prunus persicae*, 22.x.1990; Leighton Buzzard, on an unspecified plant, 14.xi.2005; Luton, on *Citrus* sp., 1.vi.2009; and Shelton, on *L. nobilis*, 20.x.1965.

Collection data: Ampthill (TL037382), sparse on *L. nobilis*, 4.vii.2010; Caddington (TL063194), abundant on *Citrus limon* and *Schefflera* sp. grown indoors, ix.1996 (leg. R. Hammon); Clophill (TL082377), sparse on *Ilex* x *altaclarensis*, 4.vii.2010; Luton, Winsdon Hill (TL085208), abundant on *Schefflera actinophylla* grown indoors, 25.i.1992; Sandy RSPB Reserve (TL188477), sparse on *H. helix* and *L. nobilis*, 2.vii.1994; Woburn (SP948333), sparse, all developmental stages, attended by the ant *Lasius niger* L. (Formicidae), on *L. nobilis*, 16.viii.2009.

Eulecanium douglasi (ulc) – currant soft scale

A polyphagous European species that is rarely recorded in Britain.

Collection data: Luton, Winsdon Hill (TL080210), two male tests and one adult female on *Prunus domestica*, 23.vii.1994.

Eulecanium tiliae (L.) – nut scale (Plate 16, Fig. 4)

A European species that also occurs in the Middle East and North Africa and has been introduced to North America and Tasmania. It is broadly polyphagous on woody plants, and is most frequently found on Rosaceae. It is widespread and locally common in Britain and occasionally enormous populations develop, which may damage woody ornamentals and fruit trees.

Collection data: Dunstable Downs (TL006198), *Crataegus* sp., 1.v.1993; Luton, Popes Meadow (TL087235), two post-reproductive females on *Crataegus monogyna*, 25.i.1992, Stockwood Park (TL085202), several dead females and male tests on *Carpinus betulus, C. monogyna* and *Malus sylvestris,* 30.vi.1994; Westoning, (TL032325), two adult females on *Sorbus aria*, 4.vii.2010; Whipsnade (TL008178), one adult female on *C. monogyna*, 24.vii.1994.

Lichtensia viburni (Signoret) – viburnum scale (Plate 16, Fig. 3)

A polyphagous European species that occurs most frequently on *Hedera* and *Viburnum*. It occasionally occurs in huge numbers, becoming a pest of ornamental plants.

Collection data: Ampthill (TL037382), sparse ovisacs on *Hedera helix* and *Viburnum tinus*, 4.vii.2010; Aspley Heath (SP928353), ovisacs and male test on *V. tinus*, 16.viii.2009; Clifton (TL162390), abundant ovisacs on *Viburnum* sp. 24.vii.2010 (leg. A. Outen); Holywell (TL020169), abundant ovisacs on *H. helix*, 9.viii.2010 (leg. C. Baker); Westoning church (TL028328), abundant females and male tests on *H. helix*, 4.vii.2010.

Palaeolecanium bituberculatum (Targioni-Tozzetti) – bituberculate scale

A Western Palaearctic species that feeds on Rosaceae. It occurs widely in Britain but is rarely recorded.

Collection data: Dunstable Downs (TL006198), sparse on *Crataegus* sp., 1.v.1993; Luton, Winsdon Hill (TL085210), sparse on *Crataegus* sp., 11.x.1992; Sharpenhoe Clappers (TL065295), several adult females on *Crataegus monogyna*, 27.ix.1992, sparse, male tests and post-reproductive females, 4.v.2009, post-reproductive females (adults were found in the same location after almost 17 years).

Parthenolecanium corni (Bouché) – European fruit lecanium

This species occurs widely in temperate regions and is broadly polyphagous on woody plants. It is locally common throughout Britain and a pest of numerous ornamental plants and fruit crops. The RHS has records of *P. corni* from Biggleswade, on *Pyracantha coccinea*, 4.xii.1968; and Leighton Buzzard on *Cercis* sp., vi.1950, *Cercis siliquastrum*, 29.vi.1960 and *Wisteria* sp., 28.v.2009.

Collection data: Ampthill (TL037382), several adults on *Rosa spinosissima* and *Wisteria sinensis*, hundreds of adults and thousands of first instars on *Viburnum* × *bodnantense*, 4.vii.2010; Clifton (TL162390), *Ribes nigrum*, 27.iv.2007, *Corylus avellana contorta*, 31.v.2010 (leg. A. Outen); Clophill (TL082377), sparse on *Malus domestica, Prunus laurocerasus* and *R. nigrum*, 4.vii.2010; Luton (TL086209), sparse, dead post-reproductive adults on *Lonicera nitida*, 30.vi.1994, unidentified shrubs, 14.vii.1992, 11.x.1992; Maulden church (TL058381), sparse on *C. avellana contorta*, 4.vii.2010; Sandy RSPB Reserve (TL188477), sparse on *P. coccinea*, 2.vii.1994; south Bedfordshire, dead post-reproductive adults on *Malus* sp., 31.vii.2009 (leg. PHSI); Westoning, (TL032325), several adults on *W. sinensis*, 4.vii.2010; Westoning church (TL028328), sparse on *P. coccinea*, 4.vii.2010.

Parthenolecanium pomeranicum (Fabr.) – yew scale

A European species that feeds on *Taxus*. It occurs widely in Britain, but is rarely recorded. The RHS have records of *P. pomeranicum* from Bedford, on *Taxus* sp., 28.vii.2008; and Leighton Buzzard, on *Taxus* sp., 4.v.1951.

Collection data: all records are on *T. baccata*. Ampthill (TL037382), abundant, 4.vii.2010; Flitwick (TL029342), abundant, 4.vii.2010; Rushmere, Heath Wood (SP915275), abundant, 16.viii.2009; Sandy RSPB Reserve (TL190478), two adults, 2.vii.1994; Swiss Cottage (TL148447), sparse, 17.vii.1994; Westoning church (TL028328), sparse, 4.vii.2010.

Parthenolecanium rufulum (Cockerell) – oak soft scale

A European species that is locally common in southern England and feeds exclusively on *Quercus*. Rarely recorded in Britain. In addition to the records below, a male coccid test suspected to be *P. rufulum* was also collected at Whipsnade (TL008178), on *Q. petraea*, 24.vii.1994.

Collection data: all records are on *Q. robur*. Coopers Hill (TL027378), several adults and nymphs, 4.vii.2010; Husborne Crawley (SP955360), abundant nymphs and dead post-reproductive adults, 4.vii.2010; Rushmere, Heath Wood (SP915274), one adult, 16.viii.2009; north Bedfordshire, plant nursery, several nymphs on foliage on trees imported from Germany and on trees of UK origin, 18.viii.2009 (leg. PHSI); South Bedfordshire, plant nursery, nymph on foliage, 31.vii.2009 (leg. PHSI).

Physokermes hemicryphus (Dalman) – small spruce bud scale

A European species that has been introduced to North America. It feeds on *Picea*, and rarely on *Abies*. It occurs widely in Britain, but is rarely recorded. Malumphy (2009a) showed that many early records of *P. piceae* were actually *P. hemicryphus*.

Collection data: All records are on *Picea abies*. Clophill (TL082377), sparse, 4.vii.2010; Luton, Wardown Park (TL088229), sparse, 23.xi.1992, Winsdon Downs (TL080210), one adult female, 23.vii.1994; Luton Hoo, Birch Wood (TL115182), one parasitized female, 19.vi.1994.

Pulvinaria floccifera (Westwood) – cottony camellia scale

A polyphagous Asian pest that has now become cosmopolitan. It is naturalized throughout Britain and appears to have increased its host plant range, and become far more abundant in England and Scotland during the last two decades (Malumphy & Badmin, 2007). It is a serious pest of rhododendron (Malumphy, 2009e). The RHS has records of *P. floccifera* from Great Gransden, on *Ilex* sp., 10.x.2002; Leighton Buzzard, on *Camellia* sp., 29.xi.2000 and unspecified plant, 14.xi.2005; Sandy, on *Ilex* sp., 1,xii.1986; and Wootton, on *Euonymus japonica*, 9.vi.1999.

Collection data: Ampthill (TL037382), abundant on *Ilex aquifolium* and *Taxus baccata*, 4.vii.2010; Clifton (TL162390), abundant on *I. aquifolium*, 10.viii.1999 (not present in subsequent years) (leg. A. Outen); Clophill (TL082377), sparse on *Ilex × altaclarensis*, 4.vii.2010; Coopers Hill (TL027378), abundant on *I. aquifolium*, 4.vii.2010; Rushmere, Heath Wood (SP913275), abundant on several widely dispersed *I. aquifolium*, 16.viii.2009; Westoning church (TL028328), sparse on *I. aquifolium* and *T. baccata*, 4.vii.2010.

Pulvinaria hydrangeae Steinweden – hydrangea scale

A polyphagous pest suspected to be of Asian origin that is widespread in Europe, North America, Australia and New Zealand. It was first detected in Britain in the 1980s and has since spread throughout England. It is a serious pest of *Hydrangea* sp., *Viburnum* sp. and many other woody ornamental plants. The RHS has a record of *P. hydrangeae* from Bedford, on *Morus* sp., 8.ix.2009.

Pulvinaria regalis Canard – horse-chestnut scale (Plate 16, Fig. 5)

A polyphagous pest suspected to be of Asian origin that has become widespread in central and northwest Europe since the 1960s, when it was first described from France (Canard, 1968; Kozár *et al.*, 1994). This species is likely to occur throughout Bedfordshire where suitable host plants are present, as it was found in all locations visited by the author. Only the earliest collection dates are listed for each locality in order to shorten the large number of records.

Collection data: Ampthill (TL037382), sparse on *Acer negundo* '*variegatum*', *Acer pseudoplatanus* (including varieties with yellow and purple leaves), *Aesculus hippocastanum, Euonymus japonicus, Laurus nobilis, Skimmia japonica* and *Tilia cordata*, 4.vii.2010; Aspley Heath (SP928353), sparse on *A. pseudoplatanus*, 16.viii.2009; Bedford, city centre (TL0449, TL0549), abundant on *A. pseudoplatanus, A. hippocastanum,* 17.vii.1994, Bedford General Hospital (TL0449), *Tilia* sp., 26.vi.1999 (leg. A. Outen); Bigglesworth (TL2043), abundant on *A. hippocastanum* and *Tilia* sp., 2.vii.1994; Caddington (TL0619), adult females and third instars on *L. nobilis*, 23.iv.1992 (leg. R. Hammon); Clophill (TL082377), sparse on *Acer* sp. and *T. cordata*, 4.vii.2010; Coopers Hill (TL027378), abundant on *T. cordata*, 4.vii.2010; Dunstable Downs (TL006198), on *A. pseudoplatanus,* 1.v.1993; Flitwick (TL029342), abundant on *Tilia × vulgaris*, 4.vii.2010; Heath and Reach (SP924281), *T. cordata*, 16.viii.2009 (sparse); Hockliffe, church (SP966269), *Acer campestre* and *T. cordata*, 16.viii.2009 (sparse); Husborne Crawley (SP955360), abundant on *Acer platanoides* and *A. hippocastanum*, 4.vii.2010; Leighton Buzzard (SP921250), abundant on *A. hippocastanum,* 11.vii.1994; Maulden (TL051380), sparse on *A. pseudoplatanus* and *A. hippocastanum*, 4.vii.2010; Maulden (TL051380), sparse on *T. cordata*, 4.vii.2010; Rushmere, Heath Wood and Field (SP916273, SP911273), sparse on *A. pseudoplatanus*, 16.viii.2009; Luton (TL0720, 0820, 0822, 0920, 0721, 0821, 0921, 1021), abundant, very common throughout the south and centre of the town, including Farley Hill, Stockwood Park, Wardown Park and Winsdon Hill, *A. platanoides, A. pseudoplatanus, Acer* sp., *A. hippocastanum*, *Tilia* sp., *Ulmus* sp. and unidentified trees and shrubs, 11.x.1992, various dates vi-vii.1994, Popes Meadow (TL087235), overwintering nymphs on *A. hippocastanum*, *Hedera helix* and *Tilia* sp., 25.i.1992; Luton Hoo, Lake and Warren Drive (TL115183), abundant, females with ovisacs, active first instars on *A. pseudoplatanus* and *Ulmus* sp., 19.vi.1994; Old Linslade, cemetery (SP909268), abundant on *T. cordata*, 16.viii.2009; Sandy RSPB Reserve (TL191481), sparse on *A. pseudoplatanus*, 2.vii.1994; Swiss Cottage (TL148447), sparse on *A. pseudoplatanus* and *Ulmus* sp., 17.vii.1994;

Tebworth (SP990267), sparse on *A. pseudoplatanus*, 16.viii.2009; Toddington (TL006291), sparse on *A. pseudoplatanus,* 16.viii.2009; Westoning (TL032325), abundant on *A. platanoides, A. pseudoplatanus* and *Ulmus procera*, 4.vii.2010; Westoning church (TL028328), sparse on *A. pseudoplatanus, Acer* sp., *A. hippocastanum* and *T.* × *vulgaris,* 4.vii.2010; Whipsnade (TL008178), abundant on *A. pseudoplatanus* and *A. hippocastanum*, 24.vii.1994; Woburn (SP948333), sparse on *A. pseudoplatanus*, abundant on *T. cordata*, 16.viii.2009.

Pulvinaria vitis (L.) – woolly vine scale

A polyphagous Palaearctic species that has been introduced to North America. It is locally common throughout Britain and occasionally a pest of grapevine, peach and currants. The RHS has a record of *P. vitis* from Luton, on an unspecified plant, 28.v.2002.

Collection data: Clophill (TL082377), several adults with ovisacs, some were unusually small being only 3 mm in length, on *Pyracantha coccinea*, 4.vii.2010; Flitwick (TL029342), single adult with ovisac on *Crataegus monogyna*, 4.vii.2010; Flitwick Moor (TL045351), single adult with ovisac on *C. monogyna*, 4.vii.2010 Luton, Stockwood Park (TL085202), one female on *C. monogyna*, 30.vi.1994, Winsdon Hill (TL085210), one parasitised female on *Crataegus* sp., 11.x.1992, 20.xi.1996; Luton Hoo, Lake and Warren Drive (TL115183), females with ovisacs and empty male tests on *C. monogyna*, 19.vi.1994; Sandy (TL193476), two adults with ovisacs on *C. monogyna*, 2.vii.1994; Toddington (TL006291), one female on *C. monogyna*, 16.viii.2009.

ERIOCOCCIDAE – felt scales

Cryptococcus fagisuga Lindinger – beech scale

A European species that has been introduced to North America. It feeds on *Fagus* and occurs throughout Britain, frequently in very high densities. It is associated with the transmission of a fungal beech bark disease caused by *Nectria coccinea* var. *faginata* Lohman, Watson & Ayers and *Neonectria galligena* (Bres.) Rossman & Samuels (Ascomycota: Hypocreales: Nestriaceae) (Kosztarab Kozár, 1987). The RHS has a record of *C. fagisuga* from Leighton Buzzard, on Fagus sp.,14.xii.1961.

Collection data: All records are on *F. sylvatica*. Ampthill (TL037382), abundant, 4.vii.2010; Clophill (TL082377), massive population infesting the trunks, smaller branches and apical twigs (diameter 2 mm) of several plants in a pruned beech hedge and appearing similar to white fungal growth, 4.vii.2010; Coopers Hill (TL027378), massive populations on the main trunks of many mature trees, 4.vii.2010; Luton, Popes Meadow (TL087235), 25.i.1992, Stockwood Park (TL085202), abundant, 30.vi.1994, Winsdon Hill (TL085210), 11.x.1992; Luton Hoo, Birch Wood (TL115182), abundant, 19.vi.1994; Rushmere, Heath Wood (SP916274), sparse, 16.viii.2009; Sandy RSPB Reserve (TL188477), abundant, 2.vii.1994; Swiss Cottage (TL148447), 17.vii.1994, abundant; Tebworth (SP990267), abundant, 16.viii.2009; Whipsnade (TL008178), abundant, 24.vii.1994; Woburn (SP949331), abundant, 16.viii.2009.

Pseudochermes fraxini (Kaltenbach) – ash bark scale

A European species that feeds on *Fraxinus*. It occurs throughout Britain, frequently in very high densities together with the willow scale *Chionaspis salicis* (L.).

Collection data: All records are on *Fraxinus excelsior*. Ampthill (TL037382), abundant, 4.vii.2010; Aspley Heath (SP928353), sparse, 16.viii.2009; Clipstone

(SP946263), sparse, 16.viii.2009; Clophill (TL082377), sparse, 4.vii.2010; Dunstable Downs (TL006198), 1.v.1993; Flitwick (TL029342), massive population, 4.vii.2010; Luton, town centre (TL091212), abundant, 30.vi.1994, Winsdon Hill (TL085210), abundant, 11.x.1992, 14.vii.1994; Luton Hoo, Birch Wood (TL115182), abundant, 19.vi.1994; Sandy RSPB Reserve (TL188477), abundant, 2.vii.1994; Swiss Cottage (TL148447), sparse, 17.vii.1994; Westoning, (TL032325), sparse, 4.vii.2010; Whipsnade (TL008178), abundant, 24.vii.1994.

ASTEROLECANIIDAE – pit scales

Asterodiaspis quercicola (Bouché) – small pit scale

A western Palaearctic species that has been introduced to North America, South Africa, New Zealand and Mauritania. It feeds exclusively on *Quercus* and is common throughout Britain.

Collection data: All records are on *Q. robur*. Husborne Crawley (SP955360), abundant, thousands of first instars, 4.vii.2010; Luton, Stockwood Park (TL080199), sparse, 30.vi.1994, 2.vii.1994, Winsdon Hill (TL085210), 11.x.1992; Luton Hoo, Birch Wood (TL115182), sparse, adult females with eggs, 19.vi.1994; Sandy RSPB Reserve (TL188477), sparse, 2.vii.1994; Swiss Cottage (TL148447), sparse, 17.vii.1994; Westoning church (TL028328), 4.vii.2010.

Asterodiaspis variolosa (Ratzeburg) – golden pit scale (Plate 16, Fig. 1)

A western Palaearctic species that has spread so widely that it has become almost cosmopolitan. It feeds on *Quercus* and is very common throughout Britain.

Collection data: All records were on *Q. robur*. Rushmere, Heath Wood (SP916274), abundant, 16.viii.2009; north Bedfordshire, several, 18.viii.2009 (leg. PHSI); Sharpenhoe Clappers (TL065295), sparse, numerous empty pits, 4.v.2009.

DIASPIDIDAE – armoured scales

In addition to the seven species listed below, the RHS has records of *Carulaspis* sp. from Luton, on *Chamaecyparis lawsoniana*, 28.x.1992 and *Cupressocyparis leylandii*, 21.x.1997. There are two species of *Carulaspis* recorded on these host plants present in Britain, *C. juniperi* (Bouché) and *C. minima* (Targioni-Tozzetti).

Carulaspis minima (Targioni-Tozzetti) – minute cypress scale

A Mediterranean species that has been introduced to West Africa, Hawaii, North and South America, and the Caribbean. It feeds on Cupressaceae and was first detected in Britain by Newstead in 1898 at the Royal Botanic Gardens, Kew (Newstead, 1900, 1901).

Collection data: Sandy RSPB Reserve (TL188477), abundant on × *Cupressocyparis leylandii*, 2.vii.1994.

Chionaspis salicis (L.) – willow scale

A Palaearctic species that has been introduced to parts of Asia and North America. It is polyphagous on woody plants and a minor pest of currant bushes and willow.

Collection data: Bedford, Priory Country Park (TL076493), sparse on *Salix* sp., 17.vii.1994; Clophill (TL082377), sparse on *Salix alba*, 4.vii.2010; Flitwick (TL029342), massive population on *Fraxinus excelsior*, 4.vii.2010; Flitwick Moor (TL045351), abundant on *Alnus glutinosa* and *Salix caprea*, 4.vii.2010; Hockliffe,

church (SP966269), sparse on *F. excelsior*, 16.viii.2009; Husborne Crawley (SP955360), massive population on *F. excelsior*, 4.vii.2010; Luton, town centre (TL0821, 0822, 0921, 0922), abundant on *Salix* sp. and *Tilia* sp., 30.vi.1994, Stockwood Park (TL085202), abundant on *Syringa* sp., *Tilia* sp. and unidentified trees, 30.vi.1994, Winsdon Hill (TL085210), abundant on *F. excelsior*, 11.x.1992, 14.vii.1994; Luton Hoo, Lake (TL116186), abundant on *Salix* sp., 19.vi.1994; Sandy RSPB Reserve (TL188477, TL191481), abundant, numerous male tests on *Salix* sp. and *Tilia* sp., 2.vii.1994; Sharpenhoe Clappers (TL065295), abundant on *F. excelsior*, 4.v.2009; Stockwood Grove County Park, lake (SP916289), sparse on *S. caprea*, 16.viii.2009; Swiss Cottage (TL148447), sparse on *Salix* sp., 17.vii.1994; Whipsnade (TL008178), sparse on *Salix* sp., 24.vii.1994; Woburn (SP948335), abundant on *F. excelsior,* 16.viii.2009.

Diaspidiotus bavaricus (Lindinger) – blueberry armoured scale

A European species that feeds on members of the Ericaceae. It occurs widely in Britain but is rarely recorded, possibly because it is remarkably cryptic, often being hidden beneath peeling bark, bracts and algae growing on the stems of heather.

Collection data: Stockwood Grove County Park (SP912294), abundant on *Calluna vulgaris*, 16.viii.2009.

Diaspidiotus ostreaeformis (Curtis) – yellow plum scale

Almost cosmopolitan, broadly polyphagous on woody plants, and a pest of fruit trees, especially plum. It occurs widely in Britain but is rarely recorded, possibly because it is highly cryptic on the bark.

Collection data: Flitwick Moor (TL045351), numerous on the main trunks of *Betula alba*, 4.vii.2010; Woburn (SP950331), abundant on very old *Malus domestica*, 16.viii.2009.

Diaspidiotus zonatus (Frauenfeld) – zonate armoured scale

A European species that feeds on woody plants, but is most frequently found on *Quercus*. It occurs widely in Britain but is rarely recorded, possibly because it is highly cryptic.

Collection data: All records are on *Quercus robur*. Coopers Hill (TL027378), low numbers of larvae and dead adults,, 4.vii.2010; Husborne Crawley (SP955360), abundant post-reproductive adults on twigs and hundreds of first and second instars on foliage, 4.vii.2010; Rushmere, Heath Wood (SP915274), sparse, 16.viii.2009; Luton, Stockwood park (TL081199), several females on twigs, males on leaves, 2.vii.1994; Sharpenhoe Clappers (TL065295), sparse, 4.v.2009.

Lepidosaphes ulmi (L.) – mussel scale

A Palaearctic species that has spread widely throughout the temperate regions of the world. It is common throughout Britain and is broadly polyphagous on woody hosts, with a preference for plants belonging to the Rosaceae. It is a pest of apple, pear, cherry, walnut and many other trees and shrubs. The RHS has records of *L. ulmi* from Bedford and Biddenham, on *Malus* sp., 1.x.1963.

Collection data: Ampthill (TL037382), abundant on *Crataegus laevigata*, 4.vii.2010; Aspley Heath, woods (SP928353), sparse on *Sorbus aucuparia* 16.viii.2009; Bigglesworth (TL1942), abundant on bark and fruit of *Malus domestica*, ix.2009 (leg. R. Lawrence); Clifton (TL162390), on *Crataegus* sp., 1989 (leg. A. Outen); Clophill (TL082377), abundant on mature *M. domestica*, sparse on *Pyracantha coccinea*, 4.vii.2010; Coopers Hill (TL027378), abundant on *Calluna vulgaris*, 4.vii.2010;

Dunstable Downs (TL006198), on *Crataegus* sp., 1.v.1993; Flitwick (TL029342), abundant on *Crataegus monogyna*, 4.vii.2010; Flitwick Moor (TL045351), abundant on *C. monogyna* and *M. domestica*, 4.vii.2010; Luton, Popes Meadow (TL087235), *C. monogyna*, 25.i.1992, Stockwood Park (TL082198), abundant on *Sorbus aria*, 2.vii.1994, Winsdon Hill (TL085210), on *Crataegus* sp. and *Malus* sp., 11.x.1992; Luton Hoo, Warren Drive (TL115183), abundant on *C. monogyna* and *Prunus* sp., 19.vi.1994; Maulden church (TL058381), sparse on *Prunus spinosa*, 4.vii.2010; Old Linslade, cemetery (SP909268), abundant on *Malus* sp., 16.viii.2009; Rushmere, Heath Wood (SP911273), sparse on *C. monogyna*, 16.viii.2009; Sandy RSPB Reserve (TL188477), sparse on *Malus* sp., 2.vii.1994; Sharpenhoe Clappers (TL065295), abundant on *C. monogyna*, *Malus* sp. and *S. aria*, 4.v.2009; south Bedfordshire, abundant on *Malus* sp., 31.vii.2009 (leg. PHSI); Studham (TL 020170), on *M. domestica*, 2010 (leg. C. Baker); Toddington (TL006291), sparse on *C. monogyna* and *S. aria,* 16.viii.2009; Westoning, (TL032325), sparse on *Sorbus aria*, 4.vii.2010; Woburn (SP950331), abundant on *M. domestica*, 16.viii.2009.

Unaspis euonymi (Comstock) – euonymus scale

A polyphagous pest suspected to be of Asian origin that has spread widely in warm temperate regions. It has become locally naturalized in southern England since at least the 1950s (Dennis, 1969). It is a major pest of *Euonymus*, particular *E. japonica,* and often causes die back or even kills euonymus hedges in southern England. The RHS has a record of *U. euonymi* from Dunstable, on *Euonymus* sp., 27.iii.2006.

Collection data: Ampthill (TL037382), abundant, thousands of first instars, on *Euonymus japonica*, 4.vii.2010.

INTRODUCED SPECIES ESTABLISHED ON INDOOR PLANTINGS

MONOPLEBIDAE – giant scales

Icerya purchasi Maskell – cottony cushion scale

This species has recently become naturalized in the London area (Watson & Malumphy, 2004), but may be restricted to indoor plantings in Bedfordshire. The RHS has records of *I. purchasi* from Dunstable, on an unspecified plant, 10.v.2005; and Sandy, on *Acacia* sp., 1.vii.2008 and 28.iv.2009.

Collection data: North Bedfordshire, plant nursery, adults and nymphs, breeding at the site for several months on *Citrus limon* from Portugal, 23.i.2008 (leg. PHSI).

PSEUDOCOCCIDAE – mealybugs

Planococcus citri (Risso) – citrus mealybug

This is a cosmopolitan polyphagous pest that is very common on indoor plantings throughout Britain.

Collection data: Luton (TL086209), abundant on *Crassula portulacea*, 30.vi.1994.

Pseudococcus viburni (Signoret) – glasshouse mealybug

In addition to the record below, Alan Outen photographed mealybugs infesting *Adromischus marianae* and *Opuntia* sp. in his glasshouse in Clifton (TL162390) that are almost certainly this species. They were being eaten by the coccinellid, *Cryptolaemus montrouzieri* Mulsant.

PLATE 13
1: A plastic larval rearing pot containing a layer of denatured sphagnum, a sprinkling of pea gravel on 3–4 cm of moss peat and a bottom drainage layer of 2–3 cm of pea gravel. Leaves with developing larvae are laid in the centre of the pot on moistened sphagnum, 2: Pots stored outdoors, in a north-facing position, early to late winter.

PLATE 14
1: Pots tilted at an angle drying out in spring, 2: Use of perforated bread wrappers to maintain both humidity and aeration inside pots.

PLATE 15

1: Technique for rearing woody stem feeders such as the tortricid *Cydia milleniana*, 2: Technique for rearing larvae that pupate in wood or stems. The container is covered with stocking mesh and a glass plate to provide aeration and prevent larvae from escaping.

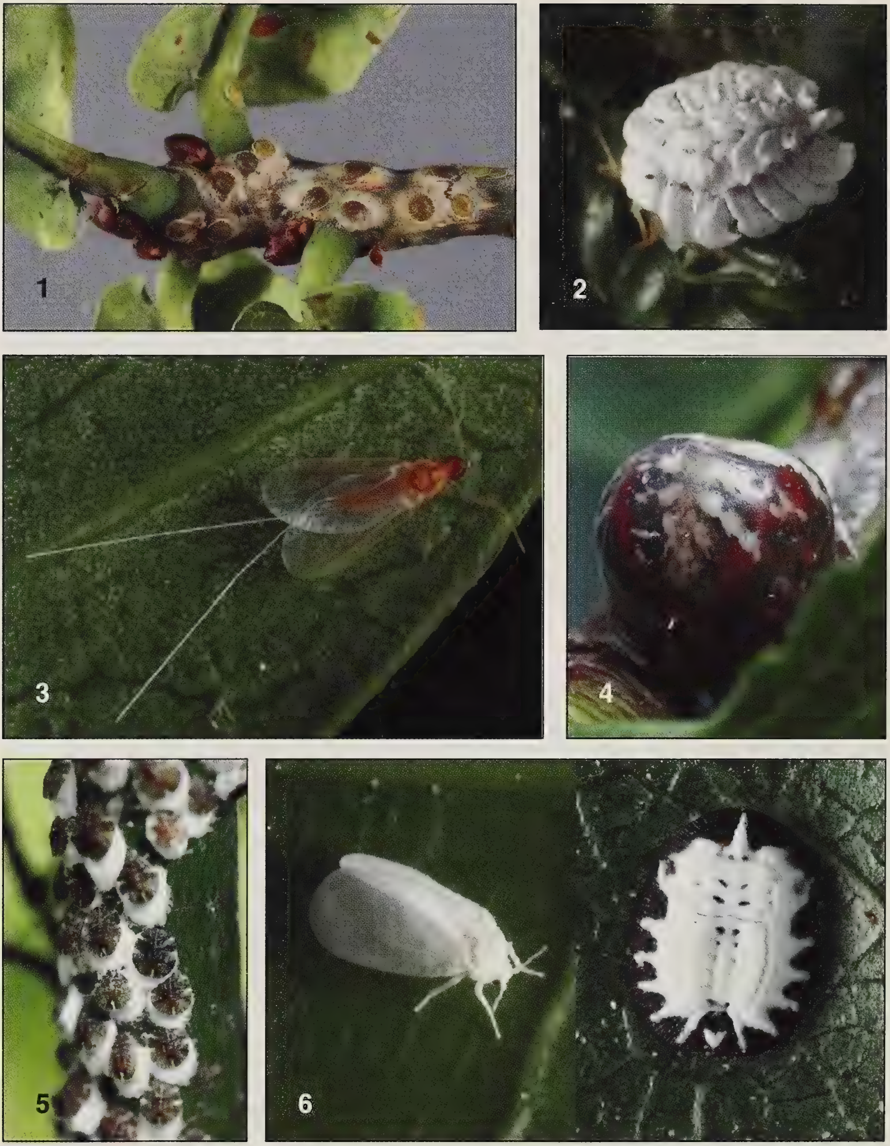

PLATE 16
1: Adult female *Asterodiaspis variolosa* causing pit galls on oak. 2: Adult female *Newsteadia floccosa* on moss. 3: Adult male *Lichtensia viburni* on viburnum. 4: Teneral adult female *Eulecanium tilliae* on plum. 5: Colony of adult female *Pulvinaria regalis* with ovisacs on Japanese maple. 6: Adult (left) and puparium (right) *Aleurochiton aceris* on Norway maple (photos: Fera).

Collection data: Caddington (TL063194), abundant on *Carpobrotus* sp., *Crassula portulacea* and *Graptopetalum bellum*, ix.1996 (leg. R. Hammon).

Rhizoecus sp. – a root mealybug

Suspected to be either *R. cacticans* (Hamilton) or *R. falcifer* Kunckel d'Herculais.

Collection data: Clifton (TL162390), on the roots of succulent plants (leg. A. Outen).

COCCIDAE – soft scales

Saissetia coffeae (Walker) – hemispherical scale

This species occurs widely in tropical and subtropical areas and is broadly polyphagous. It occurs widely in botanical collections in Britain.

Collection data: Caddington (TL063194), sparse on *Chlorophytum* sp., ix.1996 (leg. R. Hammon).

DIASPIDIDAE – armoured scales

Abgrallaspis cyanophylli (Signoret) – cyanophyllum scale

This is a polyphagous cosmopolitan species that occurs widely in Britain in botanical collections. It has also recently been found breeding outdoors in southern England. The RHS has a record of *A. cyanophyllum* from Bedford, on *Opuntia* sp., 3.x.1958.

Pinnaspis buxi (Bouché) – boxwood scale

This species is widespread in the tropics and subtropics and occurs on indoor plantings in cooler regions. It is broadly polyphagous, feeding on plants belonging to at least 46 families and is common on Arecaceae and Pandanaceae. It is established in botanical collections in Britain but rarely recorded.

Collection data: North Bedfordshire, commercial plant nursery, on *Cordyline* sp. imported from Costa Rica, 26.iv.2006 (leg. PHSI).

ALEYRODOIDEA – whiteflies

ALEYRODIDAE – whiteflies

NATIVE AND INTRODUCED NATURALIZED SPECIES

Aleurochiton aceris (Modeer) – Norway-maple whitefly (Plate 16, Fig. 6)

A European species that feeds exclusively on *Acer platanoides*. Although possibly native, the presence of *A. aceris* in Britain was not confirmed until 1976 (Martin, 1978) and it is now widespread and locally common in southern England. It has two generations annually and the puparia exhibit distinct dimorphism: winter puparia are dark with a dorsal dense coating of white wax, whereas the summer puparia are pale and translucent.

Collection data: Old Linslade (SP909268), on *A. platanoides*, winter puparia and vacated summer pupal cases (with high level of parasitism), first, second and third-instar nymphs, 16.viii.2009.

Aleurotuba jelinekii (Frauenfeld) – viburnum whitefly

A European species that appears to be restricted to *Viburnum tinus* and *Arbutus unedo* in Britain but on the continent it also feeds on *Arctostaphylos* sp., *Myrtus*

communis and *Viburnum* spp.. Apparently introduced into Britain in the 1930s (Mound, 1962) and now very common throughout England.

Collection data: in all cases there were low numbers of larvae on *V. tinus*. Ampthill (TL037382), 4.vii.2010; Aspley Heath (SP928353), 16.viii.2009; Flitwick (TL029342), 4.vii.2010; Hockliffe (SP977264), 16.viii.2009; Woburn (SP948333), 16.viii.2009.

Aleyrodes lonicerae Walker – honeysuckle whitefly

A broadly polyphagous European species that is common and widespread in Britain. It is an occasional pest of honeysuckle and strawberry.

Collection data: Flitwick Moor (TL045351), sparse on *Lonicera periclymenum*, 4.vii.2010; Rushmere, Heath Wood (SP915274), abundant on *L. periclymenum*, 16.viii.2009; Stockwood Grove Country Park (SP917289), abundant on *L. periclymenum*, 16.viii.2009; Westoning (TL032325), abundant on *L. periclymenum*, 4.vii.2010.

Aleyrodes proletella **L.** – cabbage whitefly

A broadly polyphagous European species, preferring brassicas but also feeding on other plants that are (usually) smooth-leaved. It is common and widespread in Britain and a very common pest of *Brassica* spp. The puparia can often be found through the winter months.

Collection data: Ampthill (TL037382), abundant adults, eggs and larvae on *Brassica napus*, 4.vii.2010; Aspley Heath (SP928353), all stages abundant, mainly adults, on *Chelidonium majus* and *Sonchus arvensis*, 16.viii.2009; Clifton (TL162390), *Brassica* sp., 9.iv.1991, 2.iii.2008 (leg. A. Outen); Clophill (TL082377), abundant on *Sonchus* sp., 4.vii.2010; Flitwick (TL029342), abundant adults, eggs and larvae on *Sonchus* sp., 4.vii.2010; Heath and Reach (SP924282), eggs and larvae on *Brassica* sp., 16.viii.2009; Westoning, (TL032325), abundant on *Sonchus* sp. and other Compositae, sparse on adjacent *Lathyrus odoratus* and *Papaver* sp., 4.vii.2010.

Siphoninus immaculatus (Heeger) – ivy whitefly

A European species that feeds exclusively on *Hedera* spp. Widespread but rarely recorded in Britain. It was recently recorded damaging an ornamental ivy (Malumphy, 2010a).

Collection data: Luton, Winsdon Hill (TL085210), on *H. helix*, puparia, 2.v.1991; Sandy RSPB Reserve (TL188477), on *H. helix*, vacated pupal cases and abundant adults, 2.vii.1994.

Siphoninus phillyreae (Haliday) – ash whitefly

A species native to the Mediterranean region (Martin *et al.* 2000) that has spread widely in the warmer parts of the world. It is naturalised in southern England but rarely recorded (Mound, 1966). It is polyphagous, occurring most frequently on woody plants of the families Oleaceae, Punicaceae and Rosaceae.

Collection data: Clophill (TL082377), five empty pupal cases on *Pyracantha coccinea*, 4.vii.2010.

INTRODUCED SPECIES ESTABLISHED ON INDOOR PLANTINGS

ALEYRODIDAE – whiteflies

In addition to the whiteflies listed below, *Bemisia tabaci* (Gennadius) has been found on imported plants indoors at plant nurseries distributed throughout the county, for example on *Solidago* sp. from Zimbabwe 1996 and Israel 2004, 2005 and

2006; *Gypsophila* sp. from Israel, 2003; and *Trachelium* sp. from Israel 2006 and 2007. Eradicatory action was taken against *B. tabaci* in all cases when it was found on growing plants in Bedfordshire. It is a regulated quarantine pest in the European Union but is not established anywhere in the UK.

Aleurothrixus floccosus (Maskell) – woolly whitefly

A Neotropical species that has spread throughout the tropical, subtropical and warmer temperate regions of the World. It is broadly polyphagous but shows a preference for *Citrus*. It has been found on many occasions breeding on indoor plantings at botanical gardens (Malumphy, 1995) and is regularly intercepted by the PHSI on *Citrus* plants imported from the Mediterranean. It has been found outdoors in London on one occasion during the summer. The RHS has a record of *A. floccosus* from Leighton Buzzard, on *Citrus* sp., 1.xii.1986.

Trialeurodes vaporariorum (Westwood) – glasshouse whitefly

An extremely polyphagous cosmopolitan species. It is widespread and very common throughout Britain on indoor plantings and frequently occurs outdoors during the summer. The RHS has records of *T. vaporariorum* from Bedford, on *Fuchsia* sp., 23.x.1990; Biggleswade, on *Cucumis sativus*, iii.1934; Caddington, on *Solanum lycopersicum*, 2.viii.1982; Houghton Regis, on *Fuchsia* sp., *Pelargonium* sp. and *S. lycopersicum*, 14.iii.1994; Kempston, on *Fuchsia* sp., 23.x.1990; and Sharnbrook, on *C. sativus* and *S. lycopersicum*, 3.ix.1992.

Collection data: This species is so ubiquitous that it was rarely recorded when encountered by the author. It was, however, relatively common on *Fuchsia* sp., *S. lycopersicum*, and unspecified ornamental plants in indoor plantings in Luton in 1992–94. It was also common in a conservatory and green house in Cifton on *Fuchsia* sp. and *Pelargonium* sp., various dates vii.1984–iv.2010 (leg. A. Outen). Also found in commercial plant nurseries, on *Hypericum* sp. from Kenya, various dates i.2006–xii.2007; and on *Solidago* sp. from Kenya, 29.ix.2006 (leg. PHSI).

Discussion

Twenty-seven native/naturalized species of scale insect and six native/naturalized species of whitefly are recorded here from Bedfordshire. There are likely, however, to be many more species of scale insect, and a few additional whitefly species actually present in the county, as only a few localities have been investigated. In particular, none of the large number of grass/sedge feeding coccid and pseudococcid species has been found. For comparison, the author recently recorded 39 native/naturalized scale insects and 8 native/naturalized whiteflies in Watsonian Yorkshire (Malumphy, 2009b, 2010a). Although Yorkshire covers a much larger area, it is located further north where a lower number of species would be expected to occur.

The most common and widespread native scale insects species in Bedfordshire are: *Asterodiaspis* spp., *Chionaspis salicis*, *Cryptococcus fagisuga*, *Eulecanium tiliae*, *Lepidosaphes ulmi*, *Parthenolecanium corni*, *Pseudochermes fraxini* and *Pulvinaria vitis*. These are the most common species to be found throughout England and Wales. There is insufficient collection data for the whiteflies to enable any conclusions to be drawn at this stage.

Six exotic species of scale insect and three exotic species of whitefly have been found breeding outdoors in Bedfordshire: *Aleurochiton aceris*, *Aleurotuba jelenikii*, *Balanococcus diminutus*, *Carulaspis minima*, *Coccus hesperidum*, *Pulvinaria floccifera*, *P. hydrangeae*, *P. regalis* and *Siphoninus phillyreae*. Two of these species, *P. floccifera*

and *P. regalis*, are common and widespread in the county. Climate change appears to be having an influence on the distribution of scale insects and whiteflies within Europe, as species once restricted to the Mediterranean are expanding their range into more northerly latitudes. Several exotic species have appeared in Greater London in recent years (for example, *Aonidia lauri* (Bouché) (Malumphy, 1997), *Bemisia afer* (Priesner & Hosny) (Malumphy, 2003) and *Eulecanium excrescens* (Ferris) (Malumphy, 2005a)) and it is possible that these and other species may expand their range northwards into Bedfordshire.

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The author would like to express his sincere gratitude to Andrew Halstead and Andy Salisbury of the RHS for the use of the RHS records; to Charles Baker and Roger Hammon both formerly of the Central Science Laboratory (now part of FERA), Richard Vinelle of the Plant Health and Seeds Inspectorate, Alan Outen and Richard Lawrence for collecting specimens mentioned in this work. I would also like to thank the RSPB for permission to collect at the Sandy RSPB Reserve during a BNHS field trip; and to Defra for partially funding this work.

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A second British record of *Dendrothrips saltator* Uzel (Thysanoptera: Thripidae), after a gap of 79 years. – The BENHS field meeting held at Faversham Creek, Kent, on July 4 2010 was an attractive proposition for a British thysanopterist as it promised a chance to investigate stands of hog's fennel, *Peucedanum officinale*, and search for a species that had only ever been found once before in Britain. *Dendrothrips saltator* Uzel was first discovered in Britain in June 1931 by Richard Bagnall who found it in large numbers on hog's fennel at Tankerton, Whitstable, about seven miles eastwards along the Kent coast from Faversham Creek (Bagnall, 1932; as *D. peucedani* sp. n., later synonymised with *saltator* by Mound (1965), though an incorrect name, *D. saltatrix* Uzel, is also still commonly encountered in the literature (Collins, 2010)).

Hog's fennel is a rare plant in Britain, found only along a small part of the north Kent coast, in north-east Essex near Walton-on-the-Naze, and at Southwold in Suffolk (Preston, Pearman & Dines, 2002). At Faversham Creek, stands are to be found mainly along the eastern side of the creek, alongside the footpath that makes it way out towards Nagden. On July 4, it proved easy to find *Dendrothrips saltator*, at locations close to the boatyard just north of Faversham and again just before Nagden, on the embankment carrying the footpath. The population is clearly well established and strongly associated with the hog's fennel. It seems probable that I was the first entomologist to look for *D. saltator* since Bagnall and that the thrips has been present on the north Kent coast during the intervening period.

The recorded host range of *D. saltator* is somewhat diverse, it being widespread in Europe on the leaves of deciduous trees such as *Fraxinus* (Oleaceae), *Alnus* and *Corylus* (both Betulaceae), as well as having been found on *Abies* (Pinaceae), *Thuja* (Cupressaceae), *Tamarix* (Tamaricaceae), *Anthriscus*, *Ferula*, *Peucedanum* (all Apiaceae), *Artemisia* and *Eupatorium* (both Asteraceae) (Mound *et al.*, 1976; zur Strassen, 2003). It is unclear whether the association with hog's fennel is restricted to England. It would be interesting, therefore, to see whether the thrips is exclusively associated with the plant here, and, if so, if it has colonised the Essex plants. In his paper, Bagnall stated that he twice went to Walton-on-the-Naze following his initial finding at Tankerton, but by his own account he was unable to find any stands of hog's fennel.

I am particularly grateful to John Badmin who organised the BENHS field meeting at Faversham Creek and, drawing on his local knowledge, led me directly to the first stand of available hog's fennel. Voucher specimens have been deposited in the collections of The Food and Environment Research Agency (FERA) at Sand Hutton. – DOMINIQUE W. COLLINS, FERA, Sand Hutton, York, YO41 1LZ, *dom.collins@fera.gsi.gov.uk*

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FIRST INCURSION OF *LASIUS NEGLECTUS* (HYMENOPTERA: FORMICIDAE), AN INVASIVE POLYGYNOUS ANT IN BRITAIN

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Abstract

In 2009 an infestation of *Lasius neglectus* Van Loon, Boomsma & Andrasfalvy was discovered at Hidcote Manor in Gloucestershire. The purpose of this paper is to make a formal report of this first record of *L. neglectus* in Britain and also to encourage entomologists to look out for it and report any other sightings.

Introduction

Lasius neglectus, the invasive garden ant, is a small brown ant, superficially similar in appearance and behaviour to the common black garden ant *Lasius niger* (L.). Unlike *L. niger*, which is monogynous (each nest with a single queen) and has adjacent nests that compete with one another, *L. neglectus* is polygynous (each nest has many queens) and has adjacent nests that do not compete with each other. This ant probably originated from Asia Minor or Turkey (Seifert, 2000) and is thought to have been introduced into Europe with horticultural materials (Espadaler *et al*., 2007). When established it can spread over a wide area forming a super colony of interconnecting nests containing many queens. A small part of this colony including at least one queen is a viable reproductive unit that could exist in a plant pot and be carried to a new park or garden. It is thought that this is how *L. neglectus* has been spread. It was first found in Budapest in 1974 (Van Loon, Boomsma & Andrásflvy, 1990) and since then it has been found in nineteen European countries including France, Germany, Belgium and The Netherlands (Seifert, 2000; Espadaler & Bernal, 2010).

First British record

Lasius neglectus was recognised at the National Trust's Hidcote Manor in Gloucestershire, England in 2009 and reported by the BBC and other media as "The Asian Super Ant" in August 2009. Brian Ridout (an entomologist working for English Heritage) sent specimens to Xavier Espadaler (an entomologist based at Barcelona University who is monitoring the spread of this ant) who confirmed their identity. The author visited Hidcote Manor on 31 May 2010 and, on asking about the ants, was directed to the kitchen garden as the most heavily infested area. On visiting the garden the author found that there were hundreds of workers forming columns climbing the trunks of all the many fruit trees in the garden (Fig. 1). Smaller numbers were found in all the cultivated parts of the grounds, especially obvious on tree trunks, but also on the ground and in the flower beds. A few workers were also found in the plant shop near the entrance to the grounds. No other ant species were found anywhere with the exception of a single worker of *L. niger*, that was found in a "wild area" near the western perimeter of the site where no *L. neglectus* were found.

Identification

Workers of *L. neglectus* may be separated from other *Lasius* species by the following set of morphological characteristics: maxillary palps relatively long; body brownish; lack of standing hairs on scapes and tibia; mandibles with usually

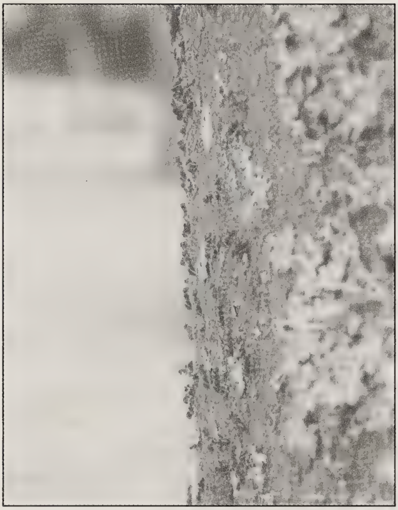

Fig. 1. A column of *Lasius neglectus* workers on the trunk of a fruit tree in the garden at Hidcote Manor, Gloucestershire, May 2010. Photo: M. Fox.

seven sometimes eight teeth; head margin behind eyes with more than 15 standing hairs; clypeus with sparse and relatively long pubescence (similar to *L. platythorax* Seifert); metanotal groove shallow (well figured by Czechowski, Radchenko & Czechowska, 2002); queens and males noticeably smaller than in other *Lasius* species. Some of these differences are subtle and wherever possible comparison with reference material, or a second opinion is recommended.

Illustrated keys that include *L. neglectus* are in Czechowski, Radchenko & Czechowska (2002) and Seifert (2007). In older keys such as Skinner & Allen (1996), Bolton & Collingwood (1975) and Brian (1977) *L. neglectus* will key out as *L. alienus* Foerster or *L. psammophilus* Seifert. However the habitat and behaviour of *L. neglectus* are quite different from either of these species.

If dark *Lasius* are seen in columns openly climbing trees in parks or gardens they are likely to be the common black garden ant *L. niger*. However if they appear a little smaller, a little paler and the columns more populous and dense than typical columns of *L. niger* then *L. neglectus* is a distinct possibility and specimens should be collected for microscopic examination. If using one of the older keys and they key out as *L. alienus* or *L. psammophilus* then it is extremely likely that they are *L. neglectus*.

Impact

Evidence from Hidcote Manor and from Europe suggests that *L. neglectus* successfully outcompetes all other species of ants. If it is able, in the future, to spread from its present anthropogenic habitats and into wilder natural areas of the UK it could cause a significant decline in populations of other British ant species.

Control

The National Trust has taken some measures to control *L. neglectus* at Hidcote Manor. Anecdotal evidence suggests that the ant has been present within the houses and buildings of Hidcote Manor for 30 years and it has been considered a nuisance to residents. A pest control consultant has been working to eradicate this ant from inside the houses that form part of the property but little or no effort is being made to control the ants in the gardens (C. Boase, 2010, *pers. comm*).

Conclusions

The extent and size of the colony at Hidcote Manor along with anecdotal evidence suggests that *L. neglectus* was introduced some years ago. Its presence in the plant shop raises the possibility that it may well have already been introduced into new areas away from Hidcote Manor in plant material purchased there. It is unlikely that

the spread of *L. neglectus* can be halted and time will tell how serious a pest this ant may become. It will be valuable to monitor its spread and it is hoped that entomologists will be vigilant in looking out for this ant and reporting its presence if encountered. The author would like to hear of any records of this ant and is willing to confirm identification. Please send 6 to 10 workers in a small tube of alcohol with a covering note giving contact details, name of collector and date and place of collection.

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SHORT COMMUNICATION

***Gargara genistae* (Fabr.) (Hemiptera: Membracidae) recorded from gorse *Ulex europaeus* in Suffolk.** – Five adult *Gargara genistae* were recorded from mature gorse *Ulex europaeus* growing both in dense stands and as isolated bushes south of Ipswich (TM1942) on 10.ix.2010. No other potential hostplant of any other species of Fabaceae was recorded at the site which forms part of the Suffolk sandling heaths. In absence of other potential hostplants it suggests that *G. genistae* had developed on gorse, which has not previously been recorded as a potential hostplant by Le Quesne (1965). It is possible that further populations of this species on gorse may occur more widely on the Suffolk heaths. Alex J. Ramsay, Calls Wharf, 2 The Calls, Leeds LS2 7JU, *alexramsay6@yahoo.com*

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CONSERVATION NEWS

Artificial rot holes for *Callicera spinolae* (Golden hoverfly)

Callicera spinolae Rondani is a hoverfly that breeds in rot-holes in mature trees in ancient woodland and parkland. The structure of pollards in particular tends to produce the nooks and crannies that generate suitable rot-hole development. The adults appear late in the season, in September, and are most likely to be spotted by watching ivy flowers on which they feed.

Callicera spinolae is restricted to East Anglia and has only been recorded from four sites since 2000. As this hoverfly is arboreal it is possible that adults are under-recorded, as was the case with *Callicera rufa* Schummel in the Caledonian pine forest. However, unlike *C. rufa* the habitat of *C. spinolae* is very fragmented which poses a threat to population viability; even if it turns out that *C. spinolae* is more abundant than previously thought.

Buglife is co-ordinating a survey at the four sites with the most recent sightings to see if adult hoverflies can be enticed to oviposit in artificial rot holes. These rot holes have already been set out and will be checked in the following spring for larvae, which are fortunately quite easy to identify. The rot holes are created by cutting the tops off milk cartons and filling them with rotting wood mulch then tying them to tree trunks. This is a proven survey technique that has been developed by specialists studying saproxylic hoverflies. If we discover evidence of good breeding populations at the four sites in question, we may try to extend the survey in 2011 to other potential sites.

Buglife secured a grant from The Mohamed bin Zayed Species Conservation Fund to help support this work, which is being carried out in partnership with The National Trust, Mid-Suffolk District Council, Chelmsford Borough Council, the RSPB and groups of volunteers associated with these organisations.

Brachinus sclopeta (Streaked bombardier beetle) found at Mile End

The Streaked bombardier beetle *Brachinus sclopeta* (Fabr.) has been found by Edward Milner at Mile End Park in London. This beetle was until recently only known from a single site just north of the Thames Barrier, which was threatened with development. In October 2007 this population was translocated to a new site close by and surveys in 2008 and 2009 showed that the beetle was still present at both the donor and recipient sites. The discovery of the Streaked bombardier at Mile End Park is particularly good news as this site is likely to be protected from development in the long-term.

Killer shrimp found in Cambridgeshire

Dikerogammarus villosus Sowinsky, the so-called Killer shrimp has been found in Grafham Water, Cambridgeshire. This shrimp which is a native of the Steppe region between the Black Sea and the Caspian Sea has spread across most of Europe in the past ten years. Unlike native freshwater shrimps which feed on detritus, *D. villosus* preys on other aquatic invertebrates and often kills its prey and

leaves it uneaten. There is a real possibility that the presence of this species will lead to changes in the ecology of waterbodies and even local extinctions of native species. It is thought that the shrimp could have arrived here in a number of ways, including boating, angling, fish-stocking or naturally with migrating birds.

Good year for Marsh fritillaries in Wales

A six year project to improve habitats for the Marsh fritillary *Euphydryas aurinia* (Rottemburg) in Wales is showing signs of success. Despite 78 hectares of land being brought into sympathetic management, populations of this butterfly had not increased. It was thought that this was likely to be due to poor weather, so the dry, sunny weather this spring was particularly welcomed and good numbers of Marsh fritillaries were seen flying on the managed sites and also on other nearby sites. This autumn a search will be made for the caterpillar's characteristic webs and hopefully they will reveal healthy numbers of this threatened species.

Knowledge dossiers

Buglife has published 15 'knowledge dossiers' for Scottish invertebrates. The dossiers, which can be accessed at *www.scottishinvertebrates.org.uk* provide a summary of the current information available for each major taxonomic grouping. The information contained within these documents includes a checklist of species found in Scotland, their distribution and conservation status, expert contacts and details of recommended identification guides. The dossiers will provide the first checklist of all invertebrates known to occur in Scotland, while also identifying priorities for conservation action, and groups where knowledge is deficient for Scotland. They will also highlight where essential resources such as identification keys are required. Further dossiers are in preparation and if any BENHS member would like to assist with their preparation please contact *chris.cathrine@buglife.org.uk*

Bumblebee Conservation Trust wins Award

The Bumblebee Conservation Trust has won the National Lottery Award for Best Environmental Project. The award, which was decided by a public vote and presented at a live celebratory event on BBC 1, was for the work undertaken by the Trust with the public, farmers and land managers to prevent further declines of bumblebees in the UK.

Brachyptera putata confirmed as endemic

Work undertaken by the Riverfly Partnership and Buglife has confirmed that the Northern February red stonefly *Brachyptera putata* (Newman) is a UK endemic species. Specimens of adults were collected David Pryce from alongside the upper reaches of the River Dee in March and sent to Peter Zwick in Germany – an international expert on stoneflies. Peter compared the specimens with *Brachyptera starmachi* Sowa, a species described from the Carpathians. The comparison showed that *B. putata* is closely related to, but clearly distinct from *B. starmachi*. The Northern February red is found in clean, fast flowing rivers in the Highlands and has also been recorded from Wales. There have been no recent records from Wales and it looks like this endemic species is now restricted to the Highlands of Scotland.

Good and bad news for *Malachius aeneus* (Scarlet malachite beetle)

There has been some good news and some disappointing news on *Malachius aeneus* (L.) in 2010. Beetle numbers appear to have dropped on the few village greens in Essex where this beetle is found. Local volunteers have been monitoring these populations, so we have good measures of local abundance, but hopefully these declines will turn out to be a blip and we will see more adults again next year.

The good news is that the beetle was quite abundant at another Essex site, on privately owned unimproved grassland. This population was discovered as part of a public survey carried out in 2008 and the owners have made arrangements to cut the field at a time that suits the beetle. Another piece of good news is that the beetle has been reared in captivity. The successfully reared beetles had access to straw, which gives some support to the theory that the larvae may develop in thatched roofs, but this is still to be confirmed. Buglife intends to carry out another public survey in 2011 to see if any new populations can be discovered.

Dainty damselfly returns

A damselfly thought to be extinct since 1953 has been found in North Kent. The Dainty damselfly *Coenagrion scitulum* (Rambur) was first recorded in Britain from a pond in East Anglia in 1946, however floods and the breaching of coastal defences during the winter of 1952/53 affected the pond and despite searches the damselfly was considered extinct. Four adults were recorded on the Isle of Sheppey by John and Gill Brook and the discovery of two larval cases suggests that the damselflies have been in Britain undiscovered for at least a year.

Silver-washed fritillary returns to Norfolk

The Silver-washed fritillary *Argynnis paphia* (L.) appears to be recolonising Norfolk after becoming locally extinct there following changes to woodland management. This year there have been records of this butterfly on the wing in Norfolk and the discovery of a breeding colony in Suffolk has led to speculation that the species may be able to establish itself once more in the neighbouring county.

Butterfly Conservation wins Award

Butterfly Conservation has won an award for improving habitat for the Duke of Burgundy *Hamearis lucina* (L.). The Bowland Award, presented annually by the National Association for Areas of Outstanding Natural Beauty, was awarded for the Denge Wood Project which aims to improve woodland habitat and encourage the growth of food and nectar plants for butterflies. Numbers of the Duke of Burgundy have increased and the butterfly has colonized two new sites. Similar increases in numbers were recorded for the Grizzled skipper *Pyrgus malvae* (L.) and Dingy skipper *Erynnis tages* (L.).

Progress on conserving *Anisus vorticulus* (Little whirlpool ram's-horn snail)

Anisus vorticulus (Troschel) was added to the EU Habitats Directive in 2004 as a species whose habitat required protection, but the UK has been slow to implement action to conserve its habitat. It is very rare and highly threatened in the UK and the Government had a legal duty to designate Special Areas of Conservation (SACs) for the snail before 2007. There was concern that sites would not be put forward until 2012, but happily Natural England has opened a consultation on three SACs for the

snail:– Pevensey Levels, Pulborough and Amberley (both Sussex) and the Broads. This is a big step forwards, although there are concerns that in the Broads over half the ditches containing the snail are outside the proposed boundary of the proposed SAC.

Modern ditch clearance methods kill the Little whirlpool ram's-horn snail and damage its habitat. This is illegal under the Directive and the UK must monitor the effects of the killing and report back to the EU regularly on the status of the snail. Natural England is currently developing the protocol under which they will licence ditch clearance and ensure that the effects are monitored.

Disturbance and taking are also illegal and there are concerns about the chilling effect of the legislation on biological surveys, studying the snail and taking the public pond dipping in areas where it occurs. This would be bad for its conservation so Buglife will investigate if a general licence can be issued that would allow this to happen under specified conditions.

Sussex emerald found in Kent

Butterfly Conservation has announced news of a new colony of the Sussex Emerald *Thalera fimbrialis* (Scopoli) in Kent. Until now the only breeding colony of this rare moth was at Dungeness, however caterpillars have been found in the Kingsdown area, near Deal, following sightings of the adult last year.

Collection of *Aeshna affinis* (Southern migrant hawker)

The arrival of several *Aeshna affinis* (Vander Linden) at Hadleigh Country Park in Essex has led to a new row over the ethics of collecting. The dragonfly, which has only been recorded in the UK on four previous occasions, was sighted in August 2010, and this led to a large influx of people wanting to see this rare migrant. On the 3rd of August a specimen was collected at the site by someone purporting to be from the 'British Museum' and the ensuing furore made national headlines and filled online wildlife discussion fora. Most commentators were very opposed to the taking of the specimen, and many refused to accept the argument that the action was justified in the name of 'science'. The individual concerned apologised and resigned from the British Dragonfly Society. We cannot be certain how the same commentators would feel about the ethics of taking a hard-to-identify specimen that was not being enjoyed by so many people - hopefully many would see that the balance of ethics was different, especially if there was a positive benefit for the species from taking a specimen. There is no doubt that this incident puts more pressure on entomologists and conservationists whose charges benefit from the data generated from people taking specimens to ensure that the ethical benefits that collecting brings are explained and that collecting activity is justifiable.

Return of the Pearl-bordered fritillary

The Pearl-bordered fritillary *Boloria euphrosyne* (L.), once abundant in southern England, has suffered a huge decline and is now extinct in many counties. Re-introductions by Butterfly Conservation, the Forestry Commission and the RSPB have however brought this species back from extinction. The re-introductions followed habitat management work to create clearings in the woodlands. Coppicing in Kent by RSPB has lead to increases in food and nectar plants, while sympathetic harvesting at Abbots Wood in East Sussex has created the clearings and rides favoured by this species.

Is the Upland summer mayfly in hot water?

The Upland summer mayfly *Ameletus inopinatus* Eaton is the only arctic-alpine mayfly species found in the UK. It is thought that increasing water temperatures are pushing this species further and further upstream, and even leading to its loss from some watercourses. Louis Kitchen (BTCV Natural Talent apprentice), Willie Yeomans (Clyde River Foundation) and Craig Macadam (Ephemeroptera Recording Scheme) were awarded the Hugh Cary Gilson Award by the Freshwater Biological Association for their project 'Is the Upland summer mayfly (*Ameletus inopinatus*) in hot water?' Over the summer they have sampled watercourses with historic records of *Ameletus* and have identified the lower altitudinal limit in five key populations. Surveys this year have shown that the species is no longer found at many of the low altitude sites. Further work is planned over the winter to establish the current distribution of this species.

Species management sheets for land owners

Buglife has produced species management sheets for land owners and managers to encourage them to apply for funding options under the current agri-environment scheme. The sheets, produced with funding from Natural England, cover species such as the Small grey sedge caddis fly *Glossosoma intermedium* (Klapalek); Blue ground beetle *Carabus intricatus* L. and the Hornet robberfly *Asilus crabroniformis* L. Details of the life cycle, threats and habitat requirements are included together with a list of Environmental Stewardship Scheme options that are applicable for the species. The sheets can be found at *www.buglife.org.uk/conservation/currentprojects/Habitats + Action/Farmland.*

OPAL water survey

The OPAL (Open Air Laboratories) project is well underway and this year its focus is the water environment. Buglife was involved in the development of a survey pack encouraging people to identify the invertebrates in their local ponds and lakes. 40,000 surveys packs were distributed across England and the results are now being collated. The OPAL website (*www.opalexplorenature.org/WaterSurvey*) allows you to explore these results using interactive graphs and maps.

White-faced darter reintroduction

An ambitious project to reintroduce the White-faced darter *Leucorrhinia dubia* (Vander Linden) to a site in Cumbria started this summer. Cumbria Wildlife Trust and the British Dragonfly Society are working together to secure the future of the White-faced darter in Cumbria. The project involves introducing larvae of the dragonfly to Foulshaw Moss Nature Reserve in South Cumbria, in the hope that they will establish a breeding population at the site.

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LIGHT INTENSITY AS A POSSIBLE TIMING CUE FOR THE SWARMING BEHAVIOUR OF *FANNIA ARMATA* (DIPTERA: FANNIIDAE)

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Abstract

Twenty swarming sites (leks) within two contrasting woods in Northamptonshire (VC32) were visited to determine the general swarming response of *Fannia armata* (Meigen) to light intensity and air temperature. Six of the leks were studied in greater depth to investigate further the microclimatic conditions under which swarming commenced and ceased. *Fannia armata* was found to be a diurnal species, with swarming generally commencing not long after sunrise, continuing throughout daylight hours and ceasing just before sunset. Swarming took place over an air temperature range of c. 13–26°C and at light intensities from c. 9–200 lux. Although a minimum air temperature was required for swarming to take place, the light intensity at the commencement of swarming was much higher than that at the cessation of swarming. The conventional explanation that the commencement of swarming is triggered by air temperature and the cessation of swarming triggered by light intensity may well apply, but some of the data suggested that light intensity may actually be acting as a timing cue for both the commencement and cessation of swarming.

Introduction

By essentially controlling body temperature, local climatic conditions or microclimate, greatly influence the behaviour of insects (Dahl, 1969; Unwin & Corbet, 1991). Light intensity, air temperature, humidity and wind constitute the major microclimatic factors, but they are inter-correlated which makes their relative contributions to a particular behavioural situation difficult to quantify. Each factor has its own part to play (Wilmer & Unwin, 1981).

Due to their direct heating effects, light intensity and air temperature probably have the greatest influence on behaviour. Light intensity has been shown both to initiate and inhibit swarming in various dipteran families, such as Chironomidae (Koskinen, 1969), Culicidae (Nielsen & Greve, 1951) and Trichoceridae (Dahl, 1969), although in these examples, air temperature had to be within certain ranges for swarming to commence. Flower visiting by some Syrphidae is influenced more by light intensity than air temperature. Gilbert (1985) found both *Melanostoma scalare* (Fabr.) and *Metasyrphus corollae* (Fabr.) to be active from about 13C, but whilst *M. scalare* was active under complete cloud cover, *M. corollae* only appeared when cloud cover was low. Providing that the sun was shining, both *Eristalis tenax* (L.) (Kato, 1943) and *Scaeva pyrastri* (L.) (Schneider, 1958) have been reported to remain active at temperatures as low as 5°C. However, light intensity does not always override air temperature. Chiang & Stenroos (1963), for example, demonstrated that air temperature had a greater influence over light intensity on the swarming activity of an *Anarete* species (Cecidomyiidae). Variations in flower visitation rates by several anthomyiid and muscid species in alpine Norway were also best explained by air temperature (Totland, 1994).

The males of most British species of Fanniidae form swarms that can often be observed in sunny conditions, keeping station beneath overhanging tree branches and above woodland paths (d'Assis-Fonseca, 1968). Being active throughout daylight hours, the Fanniidae are ideal subjects for studying the effects of microclimate on flight behaviour. A previous study on the swarming behaviour of the fanniid *Fannia armata* (Meigen) revealed that wind speed and light intensity both had a visible effect on swarming behaviour (Alderman, 2009). The effects of air temperature were not investigated and it was therefore decided to extend this earlier study by determining the influences of both light intensity and air temperature on the swarming activity of *F. armata* and in particular, the conditions under which swarming is initiated and inhibited.

Methods

Study Sites

To ensure that the results were not specific to one particular location, the study was undertaken in two contrasting sites: Delapre Woods (SP755582) and Barnstable Wood (SP848535). The sites are approximately 10km apart, with both being located in Northamptonshire (VC32). Delapre Woods is a 15ha mixed woodland on the southern boundary of Northampton, containing oak (*Quercus spp.*), sweet chestnut (*Castanea sativa*), sycamore (*Acer pseudoplatanus*), beech (*Fagus sp.*) and various conifers. The wood is open, with many paths and a varied topography and lies largely on a north-facing slope that rises from a golf course to a dual carriageway. Significant amounts of standing and fallen deadwood are present. Barnstable Wood forms part of Yardley Chase, a much larger wooded area that lies to the south of Yardley Hastings. The area used for this study lies on the western edge of Barnstable Wood, bordered by an open arable field within reach of spray drift and containing mostly ash (*Fraxinus excelsior*), oak (*Quercus robur*), field maple (*Acer campestre*), hawthorn (*Crataegus* spp.) and hazel (*Corylus avellana*). Barnstable Wood comprises densely wooded areas, separated by rides and has essentially no variation in elevation.

Equipment

A Sanyo ICT-B29X digital voice recorder and a CEM DT-8820 environment meter were used to record swarming behaviour and microclimatic conditions, along with the time of occurrence. In this paper, swarming sites are referred to as 'leks' (Heinrich & Pantle, 1975), without implying the presence of a dominance hierarchy, where during any 24-hour period, swarming takes place at sometime but not necessarily all the time. In this context it is therefore possible for swarming to either occur or not occur at any particular lek, depending on the microclimatic conditions at the time of the visit. A Garmin EtrexH (high sensitivity) handheld GPS and the open source Graphical Information System (GIS) GRASS (Neteler & Mitasova, 2008) were used to map the locations of the leks, create maps of the study areas and allowed individual leks to be revisited with confidence.

To standardise the readings, light intensity was recorded with the sensor held at 1m, pointing downwards over the spot at which either swarming was taking place or normally took place. Air temperature was also recorded from the same height. To eliminate the effects of wind, site visits were only made during calm conditions, defined here as those for which air movement was not sufficient to move the vane on a Lutron LM-8000 anemometer.

Lek Selection

Scoping visits to locate leks that hosted swarms of at least 20 individuals identified eleven suitable leks in Delapre Woods (Fig. 1a) and nine in Barnstable Wood (Fig. 1b). To enable detailed site-specific swarming behaviour to be recorded, only these leks were visited during the study period. To confirm that *F. armata* was actually being studied, each lek was sampled both at the start and the end of the study period.

Recording General Swarming Activity

To obtain an overall picture of the range of microclimatic conditions under which swarming occurred, both study sites were visited at various times between approximately 05:00h to 18:00h (GMT) during May and June 2010. Light intensity, air temperature and whether or not swarming was taking place were recorded on each lek visit. To balance the risk of recording pseudoreplicates against the number of available leks and available survey time, the Delapre Woods leks were only visited once a day. Barnstable Wood was visited on the 12 and 21 June; the leks being sampled in turn, leaving a minimum of two hours before repeating the visits. To cater for the possibility that there may have been a time lag between changes in microclimatic conditions and changes in swarming behaviour, data were only collected after a lek had been either in sun or shade for at least 15 minutes.

Recording Swarm Commencement and Cessation

To determine the microclimatic conditions under which swarming commenced and ceased, three leks from each wood were studied in greater detail (Fig. 1). To obtain data from different locations the leks were selected from those previously identified, based on the criteria of their being likely to experience contrasting microclimatic conditions. The long swarming period for *F. armata* reported in Alderman (2009), suggested that swarming commenced around sunrise and ceased around sunset. To record the changing conditions as this happened, each lek was visited as described in

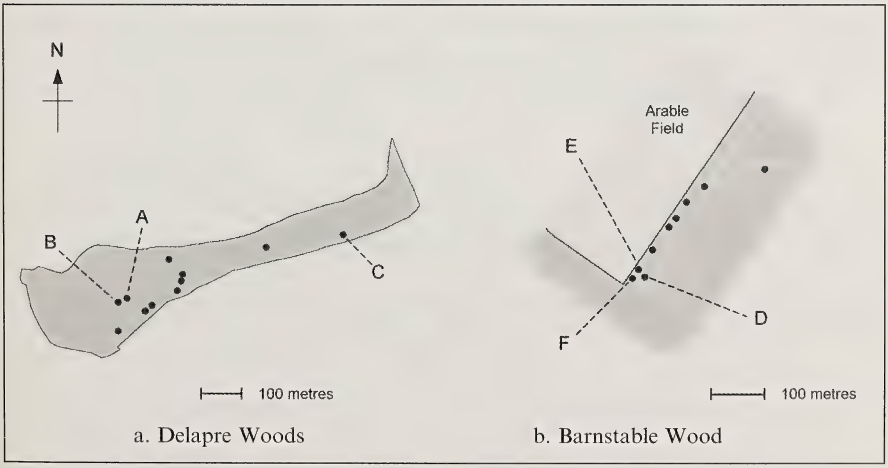

Fig. 1. Maps of the two study sites, showing (a) the eleven leks in Delapre Woods and (b) the nine leks in Barnstable Wood. The identified leks were selected for the more detailed swarming observations, as detailed in the text.

Table 1. Dates and times that selected leks of *Fannia armata* were visited in 2010 to record the behaviour and microclimatic conditions as swarming commenced and ceased. Combined visits were made to adjacent leks to make efficient use of field visits.

Visit Date	Leks Visited	Visit Times (GMT)
22 June	C	18:03–18:58
23 June	D, E and F	15:49–18:45
23 June	A and B	03:53–05:29
25 June	D, E and F	04:12–07:39

Table 1. Light intensity, air temperature and the time of data collection were recorded approximately every 10 minutes during each visit.

Sunrise was 03:40h and sunset 20:30h (GMT) on all visit days, which removed any effects of variations in day-length and enabled the time of day to be used as a baseline comparator. All the visit days were also sunny, with few clouds and no wind, effectively removing any differences in weather and the microclimatic effects of air movement from the results.

Results

General Swarming Activity

To provide an overall visualisation of the microclimatic conditions under which swarming of *F. armata* occurred, the data sets for both woods were combined. The results showed that swarming in *F. armata* occurred mainly between approximately 14°C to 26°C and at light intensities of approximately 20 lux and above (Fig. 2).

Swarming Commencement

Individuals of *F. armata* at the selected leks A, B, D, E and F all behaved in a similar manner when starting to swarm. As light intensity and air temperature

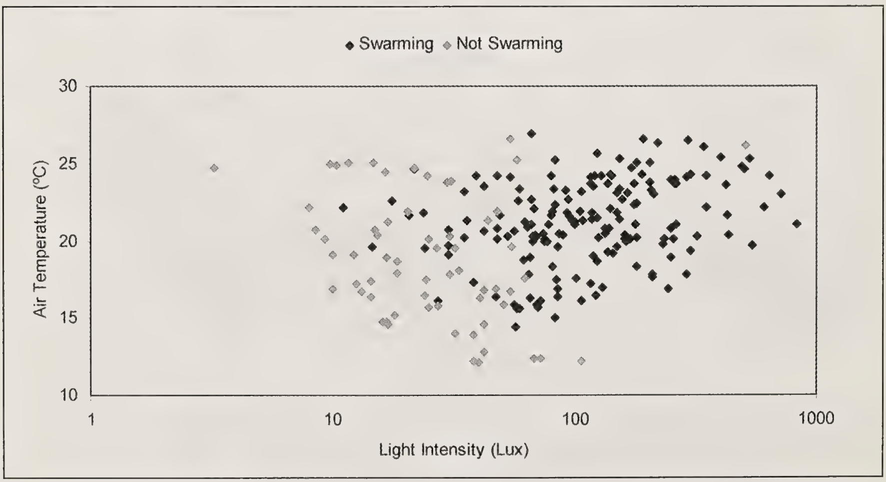

Fig. 2. Light intensity and air temperature of general swarming activity of *Fannia armata* at leks observed in Delapre Woods and Barnstable Wood.

increased, flies began to take short flights and eventually started swarming. Once the process had started, swarms formed rapidly, in all cases within five minutes.

In general, swarming did not start until light intensity reached at least approximately 20 lux, but only when the air temperature was above approximately 13–14°C (Table 2).

The air temperature at lek A rose 0.3°C and at lek B rose 0.2°C from the start of the observations until swarming commenced (Fig. 3), whilst the air temperature at leks D, E and F rose 2.7°C, 3.3°C and 4.5°C respectively (Fig. 4). In all cases, swarming commenced after a period of steadily rising light levels.

Table 2. Light intensity, air temperature and the time swarming commenced at leks A, B, D, E and F.

Lek	Light Intensity (Lux)	Air Temperature (°C)	Swarming Commenced (GMT)
A	52	13.6	06:09
B	22	13.4	06:09
D	57	13.7	06:50
E	54	14.6	07:13
F	70	15.7	07:39

Swarming Cessation

Swarms at leks C, D, E and F all behaved in a similar manner when swarming ceased. As sunset approached and light intensity declined, the swarms moved downwards, eventually settling on the substrate. In essence, swarming stopped when light intensity declined to approximately 6–9 lux (Table 3).

Rather than declining gradually as sunset approached, individual leks experienced variations in light intensity due to sunflecks reaching and leaving the leks. Sunflecks stopped reaching leks D and F at approximately 17:30h (GMT), thereafter light intensity declined gradually (Fig. 5). Site E, being on the western edge of the wood, in more open conditions, was subject to widely fluctuating light intensity until recording ceased at 18:45h (GMT), when swarming was still taking place (Fig. 5).

Discussion

Fannia armata was found to be a diurnal species, with swarming generally commencing not long after sunrise, continuing throughout daylight hours and

Table 3. Light intensity, air temperature and the time swarming of *Fannia armata* ceased at leks C, D, E and F. When recording was stopped at 18:45h (GMT), swarming was still taking place at lek E.

Lek	Light Intensity (Lux)	Air Temperature (C)	Swarming Ceased (GMT)
C	8	22.2	18:58
D	9	19.4	18:43
E	54.8	19.6	see legend
F	5.9	19.8	18:45

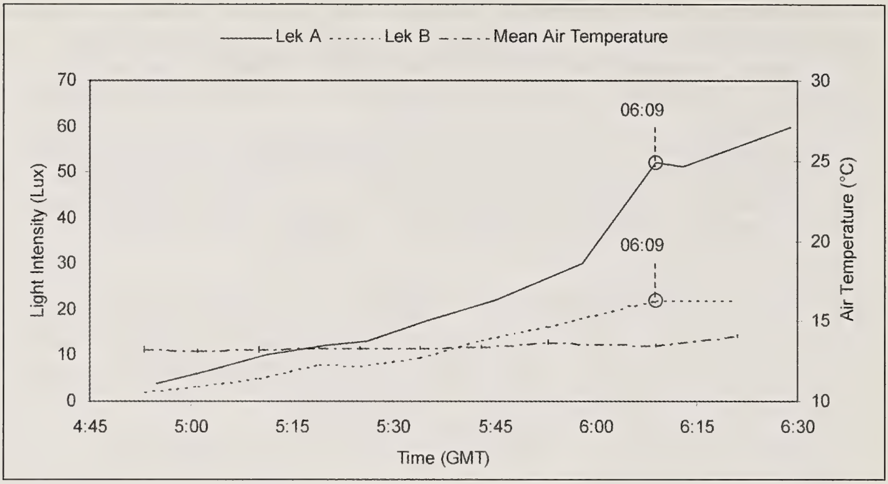

Fig. 3. Light intensity and associated mean air temperature (c/w bars showing the range) at leks A and B, before and after swarming commenced. The times above each plot show the points at which swarming commenced.

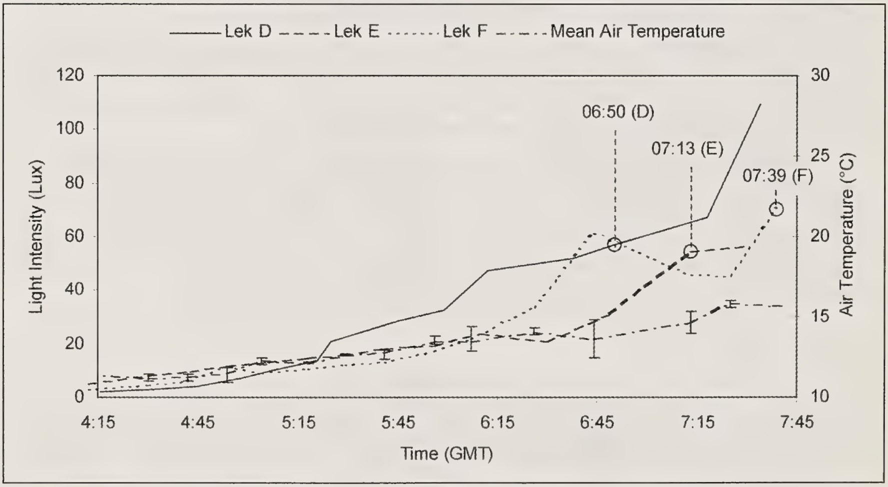

Fig. 4. Light intensity and associated mean air temperature (c/w bars showing the range) at leks D, E and F, before and after swarming commenced. The times above each plot show the points at which swarming commenced.

ceasing just before sunset. The scoping visits revealed that swarming almost always took place when the air temperature was between approximately 14°C to 26°C (Fig. 2). Further to this, data from the swarming commencement tests indicated that a minimum air temperature between 13.6°C to 15.7°C was required for *F. armata* to swarm (Table 2). This is in line with other British swarming Diptera. Gilbert (1985),

for example, found that various Syrphidae species demonstrated 'movement other than resting' with air temperatures from 11°C to 17°C.

Diptera are ectothermic animals and it can be expected that there will be a critical upper air temperature above which normal activity would cease. High air temperatures were not encountered during the study, but the suggested upper swarming air temperature of approximately 26°C is in line with other British swarming Diptera. Gilbert (1985) did not, for example, record seeing the syrphids *Episyrphus balteatus* (De Geer) and *Syritta pipiens* (L.) above approximately 25°C.

When swarming started, the light intensity was above approximately 20 lux (Figs. 3 & 4; Table 2) and continued under all recorded intensities, the highest being 1200 lux. Swarming only ceased at the end of the day when the light intensity dropped to approximately 6–9 lux (Fig. 5; Table 3). The overall conclusion from this study is that swarming in *F. armata* takes place when the light intensity is greater than approximately 9 lux, as long as the air temperature remains between approximately 13°C to 26°C.

The conventional explanation for the behaviour of *F. armata* in this study could be that the flies warmed up slowly as the air temperature increased and swarming only commenced once they were warm enough. At the end of the day, despite being warm enough, the cessation of swarming was being triggered by the decline in light intensity. If this is so, then the difference between light intensities at the commencement and cessation of swarming would be due entirely to the natural diel periodicity of air temperature and light intensity, rather than light intensity itself influencing the commencement of swarming.

The swarming commencement data for leks A and B, however, suggested a possible alternative explanation. Following a warm night, the air temperature at the start of the observations at leks A and B was already at 13.1°C and rose no more than 0.3°C over the 90 minutes from the start of the observations until swarming commenced (Fig. 3). Changes in the thoracic temperature of small flies have been shown to closely follow changes in ambient air temperature, rather than lag behind

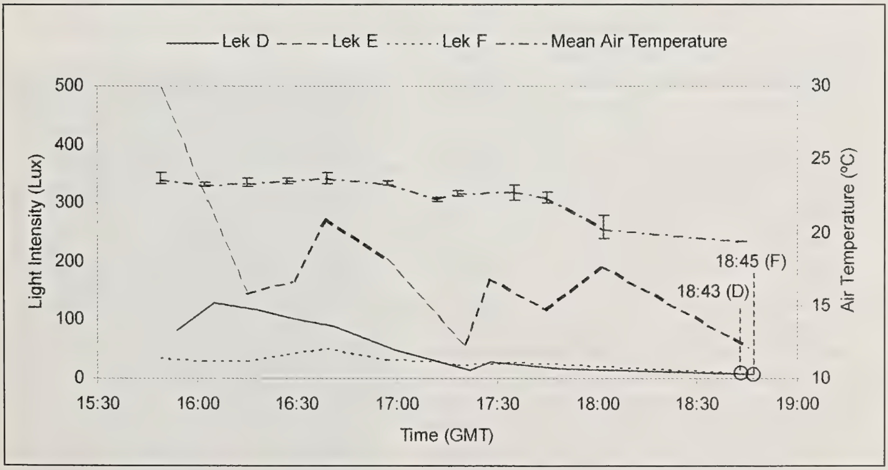

Fig. 5. Light intensity and associated mean air temperature (c/w bars showing the range) at leks D, E and F of *F. armata* prior to cessation of swarming. The times above each plot are the points at which swarming ceased at leks D and F. Swarming had not ceased at lek E at the end of the recording period.

(Willmer & Unwin, 1981). If this is the case with *F. armata*, as the air temperature over the observation period was effectively at swarming temperature, then the flies at leks A and B were probably already at swarming temperature well before they actually started to swarm. Swarming did, in fact, not commence until the light levels were well in excess of those at recorded at cessation (Tables 2 and 3). This suggests an alternative behavioural response in that regardless of whether they are warm enough, a minimum light level is required before *F. armata* will start to swarm. This in turn suggests that providing the air temperature remains between approximately 13°C to 26°C, then swarming commences at a higher light intensity than it ceases and that light intensity may be acting as a behavioural timing cue both for the commencement and cessation of swarming.

That many diptera only swarm during certain parts of the day is well known and the action of light intensity as a behavioural timing cue, with air temperature controlling the numbers undertaking that activity, has been suggested by several authors (Lewis & Taylor, 1964; Corbet, 1966; Matthews & Matthews, 2010). Mosquitoes (Culicidae) are one example family, including species with various lifestyles from diurnal through to completely nocturnal (Kawada *et al.*, 2006). Their different lifestyles have been linked to eye structure, which in turn suggests that light intensities play a part in the timing of their behaviour. One specific example of this family is *Anopheles funestus* (Giles), which was recorded swarming for only 23 minutes after sunset (Charlwood, Thompson & Madsen, 2003). In this case, the air temperature was well within the species' swarming range both before and after the swarming period, which suggested that swarming was initiated and then inhibited by the decline in light intensity at the end of the day. This study only suggests that light intensity may act a behavioural timing cue for *F. armata*, but if this is the case in mosquitoes and also, for example, in Chironomidae (Koskinen, 1969) and Trichoceridae (Dahl, 1969), then it most probably occurs in other families.

Further data are obviously required to determine the exact influence of light intensity on the swarming behaviour of *F. armata*. The author feels this is a subject well worth pursing and field experiments are being planned. Maybe other society members who feel strongly one way or the other would like to take up the challenge and undertake their own behavioural studies?

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SHORT COMMUNICATIONS

Bembidion maritimum **Stephens (Coleoptera: Carabidae) in Surrey** – *B. maritimum* was included in the Victorian County History (Champion, G. C., Donisthorpe, H. St. J. K. & Lloyd, R. W., 1902. *Beetles*. In Malden, H. E. (ed.), *The Victorian County History of Surrey, Part* 3), but had not been recorded since, although it was found on a shingle bank on Chiswick Eyot, Middlesex in the 1970s by Peter Hammond.

On 21 April 2010, I found five adults under stones at the margins of the River Thames, just above Teddington Lock at Ham Lands (TQ163725). A week later on 28.iv., I found a single adult under debris again beside the Thames at Battersea Power Station wharf (TQ293776) in a very regularly inundated tidal section. – JONTY DENTON, 25 Glebe Meadow, Overton, Hants, RG25 3ER

Further records of *Prokelisia marginata* (van Duzee) (Hemiptera: Delphacidae) – This hopper has undergone a meteoric colonisation of the saltmarshes along the south coast of Britain (Badmin, J. & Witts, T., 2010, Cord-Grass Planthopper *Prokelisia marginata* (Hemiptera: Delphacidae) sweeps into Kent. *In Practice* **69**: 16–17), and was widespread and abundant in 2009, on open saltmarsh from East Dorset, through South Hampshire, into West Sussex and around the Isle of Wight.

DORSET: Poole Harbour – Arne Bay (SY9888), 30.vi.2009; Goathorn Peninsula (SZ0195) 12.ix.2009; ISLE OF WIGHT: Dench Beach (SZ6388), 23.vi.2009; Newtown Harbour (SZ4191) 24.vi.2009; SOUTH HAMPSHIRE: Beaulieu River, Gilbury Hard (SU4100), 16.vi.2009; Langstone Harbour – The Kench (SZ6999), Langstone Hotel Bay (SU7204) 3.vi.2009; WEST SUSSEX: Bosham Creek (SU8002), 3.vi.2009; Dell Quay (SU8302), 23.vii.2009. – JONTY DENTON, 25 Glebe Meadow, Overton, Hants, RG25 3ER.

***Gonocerus acuteangulatus* (Goeze) (Hemiptera: Coreidae) in East Kent (VC15).** – I beat two adults from a heavily fruiting hawthorn *Crataegus monogyna* in Park Wood, Chilham (TR046527) on 12.x.2010. This appears to be the first record for East Kent. The most easterly previous in the county was just 200 m inside West Kent (VC16) at Leybourne Lakes Country Park (TQ7060) in 2008 and 2010 (Eric Philp *pers. comm.*). – JONTY DENTON, 25 Glebe Meadow, Overton, Hants, RG25 3ER.

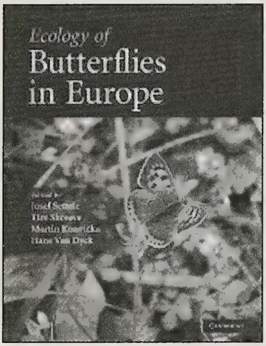
British and Irish butterflies App update by Adrian Riley. iTunes app version, 2010. £4.99. Available via http://itunes.apple.com/gb/app/british-irish-butterflies/id376331398/mt=8#.

This app was reviewed in Part 3 of this year's Journal (*BJENH* **23**:174) and is an easy way of accessing photographs and descriptions of 108 taxa, depicting 59 species of butterfly known to occur in the UK including all known subspecies and forms. This has recently been upgraded so that you can email back your findings with coordinates, date and time direct to you local Biological Records Centre.

New members of the Society

Now that we no longer hold formal indoor meetings of the Society, the election of members to the Society is undertaken by Council at committee meetings. The following new members have joined the Society during the past year:

Dr Tristan M. Bantock of London; Ms Jennifer L. Boncey, of Esparsac, France; D. H. Fisher of Brentwood; Mrs. Una C. Garland of Harpford, Devon; R. Harris of Croydon; Ms Aoife O'Rourke of Wicklow; Dr Elva Robinson of York; P. Black of Newbury; Seth Irish of London; A. J. Pym of Bristol; Dr C. W. Stanworth of Guildford; Professor P. A. Verdon of London; G. D. Clewly of Ascot; G. Jones of Birkenhead; L. A. Miles of Stratford-on-Avon; J. C. Steedman of Upper Beeding, West Sussex; D. W. W. Allen of Torquay; Ms H. Wiswell of St. Helens; D. R. Atter of Guildford; Ms S. J. Barnes of Carshalton; J. Clifton of Hindolveston, Norfolk; Dr M. Edwards of Poundbury, Dorset; Dr J. Feehan of Luxembourg; Professor M. Gandy of University College, London; T. Higginbottom of Doncaster; O. Howells of Devizes; K. Lugg of Basingstoke; M. Mead-Briggs of Winchester; D. L. Redhead of Littlemore, Oxfordshire; Mrs A. Thornhill of Ticknall, Derbyshire; J. T. Brelstaff of Reading; Peter Eeles of Thatcham, Berks; M. J. Noble of Stalham, Norfolk; M. Orchard of Didcot; and Miss V. Shephard of London.



Ecology of Butterflies in Europe. Edited by Josef Settele, Tim Shreeve, Martin Konvicka & Hans Van Dyck. 526pp. (Cambridge University Press, 2009). Soft cover £45.00. ISBN 978-0-521-74759-2.

Due to the attractiveness of butterflies and their usefulness as model systems in biology, there has been a considerable amount of material written on butterfly ecology, particularly in Europe in recent years. Indeed, many of the author's names in the book will be familiar to those with an interest in studying Lepidoptera. About 30 years ago the study of butterflies was often regarded as an academic sideline, but since then the contribution of butterfly biologists to mainstream biology has increased considerably in importance. Thus over the past 10 years there has been a remarkable synthesis of ideas and an increasing realisation that academic studies can contribute much to conservation. It is true that many areas of insect biology are first studied by rhopalocerists, so this is a pioneering book really packed full of ideas. The book owes its origins to an earlier treatise, '*The Ecology of Butterflies in Britain*' edited by Roger Dennis in 1992 which aimed to bring together all the recent information on our native butterflies. The new volume incorporates ideas from *Butterflies*: *Ecology and Evolution taking Flight* (Boggs *et al.*, 2003), *On the Wings of Checkerspots* (Erhlich & Hanski, 2004) and *The State of Butterflies in Britain and Ireland* (Fox *et al.*, 2006) amongst others, but has greater scope and depth.

The book is divided into five major parts dealing with habitat use, population ecology and genetics, evolutionary ecology, distribution and phylogeny, and global change and conservation. Part I on habitat utilisation includes interesting chapters on 'Adult food resources in butterflies' by Andreas Erhardt and Jovanne Mevi-Schütz; 'Butterfly oviposition: sites, behaviour and modes' by Enrique Garcia-Barros and Thomas Fartmann, 'Thermoregulation and habitat use in butterflies' by Per-Olof Wickman as well as chapters on larval ecology and predictive species distribution modelling.

Part II on population biology includes highly informative chapters on 'Parasitoids of European butterflies by Mark Shaw and colleagues, 'Butterfly population structure and dynamics by Robert Wilson and David Roy and a thought-provoking chapter on 'Costs and benefits of dispersal' by Thomas Hovestadt and Marko Nieminen.

The section on evolutionary ecology (Part III) includes amongst others a very readable chapter by Tim Shreeve and colleagues on 'Functional significance of butterfly wing morphology variation' and an informative paper by Bengt Karlsson and Hans van Dyck on 'Evolutionary ecology of butterfly fecundity'. This covers the studies of our own Jane Hill on the subtle body changes that occur in speckled wood butterflies as they migrate northwards in the UK.

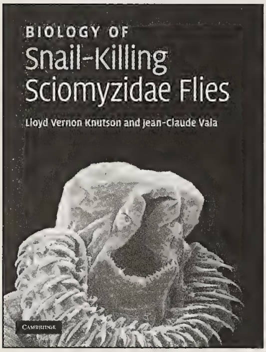
Part IV is entitled 'Species in time and space: distribution and phylogeny'. No good book on butterflies would be without a chapter by Roger Dennis and here his subject is 'Faunal structures, phylogeography and historical significance' written in conjunction with Thomas Schmitt – a thought-provoking review as usual. Equally interesting chapters on butterfly richness patterns and gradients (completely uninvestigated in other insect groups so far as I know) and ecological genetics in hybrid zones are required reading.

The last section is an important overview of our understanding of the current status of European butterflies and the success of recently implemented conservation measures.

Chapters include 'Butterflies of European ecosystems: impact of land use and options for conservation management' by Josef Settele, John Dover and colleagues, 'Conservation status of European butterflies' by Chris Van Swaay, Dirk Maes and Martin Warren, and the inevitable 'Climate warming and distribution changes in butterflies' by Jane Hill, Ralf Ohlemüller, Richard Fox and Chris Thomas.

Some of the chapters are written by names unfamiliar to British lepidopterists: these are mainland European entomologists who by necessity have to take a wider view of butterfly ecology as species populations extend well beyond their national boundaries. We would do well to take into account their ideas and concerns so that we develop a more holistic approach to the study of our native species of Lepidoptera. This is a book to be dipped into and enjoyed slowly, like a good malt – again and again.

John Badmin



Biology of Snail-Killing Sciomyzidae Flies by Lloyd Knutson & Jean-Claude Vala. 528pp. (Cambridge University Press, 2010). Hard cover £85.00. ISBN 978-0-521-86785-6.

A vast amount of information on this intensively studied family of flies has been published over the past 250 years and it is the authors' intention to provide the first comprehensive analysis of the Sciomyzidae on a world scale. The British fauna of just under 70 species specialize in attacking live Mollusca, hence their colloquial name. Flies lay their eggs either on or near a host, and the emerging larvae develop as internal parasitoids eventually killing their hosts. Depending on size and degree of physiological development, the larvae may pupate on emerging from a host or search for a second host to predate upon. For this reason sciomyzids are increasingly being viewed as potentially important candidates for biological control of snails and slugs of agricultural and medical importance. However the book covers far more than applied entomology and brings together all aspects of sciomyzid biology for review.

There are 21 chapters in all. The Introduction begins with definitions of saprophage, parasite, parasitoid and predator in relation to the Sciomyzidae with examples of their aquatic and terrestrial hosts and prey. The next chapter investigates the natural enemies of Mollusca other than Sciomyzidae – such as Hemiptera and the Coleopteran families, Carabidae, Drilidae, Lampyridae, Silphidae and Staphylinidae.

The next few chapters cover sciomyzid biology, ranging from life cycles, specialisation of adults, eggs and larvae and classification of behavioural groups. Topics covered include host/prey ranges and preferences, host/prey finding and two excellent reviews of feeding behaviour.

There are detailed chapters on phenology, reproduction and development with a review of phenological groups from the Nearctic, Neotropical, Afrotropical and Oriental regions of the world. Additional chapters cover macro- and microhabitat preferences, population dynamics, natural enemies, and how sciomyzids try to defend themselves.

A significant proportion of the book (three chapters) is devoted to morphology and taxonomy. Active instars such as adults and larvae show special adaptations to their malacophagous lifestyles, eggs and pupae less so. There are background

chapters on zoogeography and the origins and evolution of the Sciomyzidae and the closely related sister group Phaeomyiidae.

For those interested in identifying sciomyzids, there are keys to all adults and immature stages (both pupae and larvae) from all regions of the world 'enabling efficient and authoritative identification of specimens' which make this book a 'must buy' for all field dipterists. This will be very useful for those wishing to identify new species to the British Isles and those studying the near continental mainland. There is also a very useful checklist of all the world's 450 known species which provides a nice measure of nomenclatural uniformity. The book concludes with an exhaustive bibliography of 3000 technical publications and unpublished reports.

Reading reports of dipterists field meetings in the UK, I am often puzzled why there appear to be so many sciomyzid species present in any one 'locality or habitat' and wonder how they are partitioned between their molluscan 'prey/hosts'. This book goes a long way to answering these questions (and posing a lot more of course). Recent studies by Chris Williams and colleagues of Irish turloughs (2009a,b) have thrown some light on this subject and show that sciomyzid abundance and species richness occur at sites of intermediate wetness but no significant co-structure with prey communities. Obviously there is a lot more to learn about the biology of these fascinating flies. As editor, I would love to change the title of the book to 'sciomyzid flies' rather than 'Sciomyzidae flies' as this is tautology, but no doubt commissioning experts at CUP have good commercial reasons for retaining the family name in the title. A 'must buy' for any inquisitive dipterist.

John Badmin

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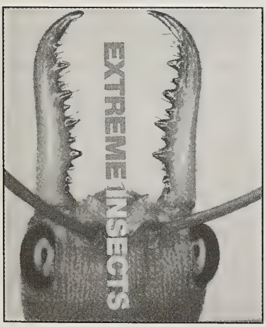
Williams, C. D., Sheahan, J. & Gormally, M. J. 2009b. Hydrology and management of turloughs (temporary lakes) affect marsh fly (Sciomyzidae: Diptera) communities. *Insect Conservation & Diversity* **2**: 270–283.



Extreme Insects by Richard Jones. 288pp. (HarperCollins Publishers, London, 2010). ISBN 978-0-00-731077. Hardback £30.00.

The author of this extremely large book, past President Richard Jones, will be familiar to most readers as a regular contributor to this journal. The book is a celebration of the insect world combining clear concise informative text and stunningly beautiful colour photographs. The aim, not precisely expressed, is to inspire the reader as to just how marvellous insects are, with examples of the biggest, fastest and most beautiful.

Extreme Insects is divided into three chapters; extreme form, extreme evolution and extreme impact. The author has been highly inventive when choosing his examples, and so we have 'highest number of wings' (*Alucita* sp.); 'largest jaws' (Grant's stag beetle *Chiasognathus granti*); 'most punctual' (periodical cicada *Magicicada septendecim*); 'most bizarre reverse metamorphosis' (streblid flies) and 'most widespread insect' (Painted Lady

Cynthia cardui). Each chosen example is allocated a two-page spread: one page for text and the other for a more often than not, fully-enlarged colour photograph of the insect. The reason for each choice is given in the header (e.g. best eyesight) with species details – common name, species name, distribution and attribute listed below for easy reference. The award for best eyesight goes to common green darner *Anax junius*. The text below is informative, accurate, highly readable and highly quotable. Approximately 136 species are illustrated in total covering 14 insect Orders, which gives a very representative account of the insect world. One might hope that it will even inspire the BBC to produce more programmes about our most prolific life form on this planet.

Inevitably, some of the chosen examples will be replaced by others as new information comes to light. Quite rightly, the best jumper in the world is described as the common froghopper *Philaenus spumarius* which incidentally can claim to be the most polyphagous. However the crown for best jumper has passed over by quite a large margin to our Christmas card plant hopper, *Issus coleoptratus*, according to recent research carried out by Malcolm Burrows, a member of our Society.

At 2.4kg, this is excellent value w/w and a buy/buy.

John Badmin

The Staphylinidae (rove beetles) of Britain and Ireland. Volume 12. Part 5: Scaphidiinae, Piestinae, Oxytelinae by Derek A. Lott. 100pp 245 × 175mm. Published for the Royal Entomological Society by the Field Studies Council. 2009. Soft back £21.00. ISBN 978-0-901546-90-6.

Around one quarter of all British species of beetle is included in the family Staphylinidae. The Reverend C. E. Tottenham intended to publish handbooks thereon in 3 parts. Unfortunately, only the first part was ever completed which resulted in the publishing of Vol IV part 8(a) in 1954.

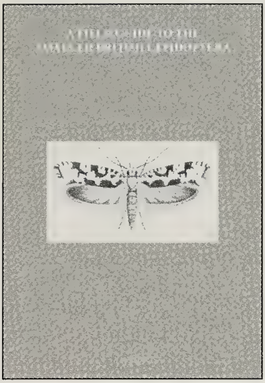
Since that time, there have been many additions, deletions, and this Handbook (Vol. 12, Part 5) updates and revises the Oxyteline group.

There are short chapters on general morphology, biology, collection methods and preservation of specimens. Keys to subfamilies and a systematic checklist are followed by the bulk of the handbook (pages 19–82) which is devoted to species identification. The keys aided by indispensible margin line illustrations unravel some of the mystique attached to the more difficult genera, although a binocular microscope is needed to appreciate many of the characters used in the keys and access to a reliable reference collection is advisable. Further information is included in the species accounts, together with summaries of habitats, geographical distribution and biology, where known. The handbook concludes with a list of references, index, and six colour plates prepared by James Turner of the National Museum of Wales depicting thirty-five representative species of the group.

All the Staphylinidae are such an interesting group and the Oxytelinae element is no exception. Having battled with the nuances of comparative external descriptions (invariably unsuccessfully, especially when the salient features are missing!), use of the dissecting needle can reveal an even more interesting challenge. Aided by the detailed contents of the handbook it is hoped to encourage a little less apprehension at coping with the more diminutive sizes of beetle.

An indispensible reference and it is to be hoped that the remaining parts will not be delayed by another 56 years!

Norman Heal



Facsimile reprint of *A Field Guide to the Smaller British Lepidoptera*, edited by the late A. M. Emmet

At the Annual Exhibition on Saturday 13 November 2010, copies were available on the Society's Publications Stand of a facsimile reprint of the well-known *A Field Guide to the Smaller British Lepidoptera* that has been out of print for some time. The price is £14 to members and £21 to non-members excluding postage and packing (currently £1.77), cheques payable to "Malthouse Books". The book is available from BENHS Publications, Malthouse Books, The Old Malthouse, Sutton Mandeville, Salisbury, Wiltshire SWP3 5LZ (www.malthousebooks.co.uk).

A Guide to the Smaller British Lepidoptera by L. T. Ford was first published by the British Entomological and Natural History Society in 1949, with a short supplement by the author issued in 1958. The summaries of life histories, together with observations of behaviour and hints on finding the different species, were an invaluable aid to microlepidopterists in Britain and Ireland. In 1979 the Society published *A Field Guide to the Smaller British Lepidoptera* edited by A. M. Emmet, who with the assistance of other leading microlepidopterists, considerably revised and extended the original text. In 1988 a second edition was published, again edited by A. M. Emmet, which added about 40 species and further revised the species accounts. This second edition has been issued by the Society as a facsimile reprint in 2010 to make the book available once more to microlepidopterists.

Erratum

In the 2009 Annual Exhibition Report (*BJENH* **23**: 175–205) the obsolete aberrant specimen of the noctuid *Paracolax tristalis* (Fabr.) figured on Plate 11 (Fig. 1) was incorrectly attributed to Martin Corley. This specimen was, in fact, exhibited by Jim Platts, who also exhibited the bred specimen of *Achlya flavicornis* (L.) shown on Plate 11 (Fig. 6). Martin Corley exhibited a separate specimen of *P. tristalis* from Portugal.

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PROCEEDINGS & TRANSACTIONS / SOCIETY NEWS

REVIEWS

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Part 4 – December 2011

Plates:

Plates 1 to 4 are between pages 28 and 29 (part 1).
Plate 5 to 8 are between pages 88 and 89 (part 2).
Plates 9 to 12 are between pages 156 and 157 (part 3).
Plates 13 to 16 are between pages 224 and 225 (part 4).
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OTHER PABULA

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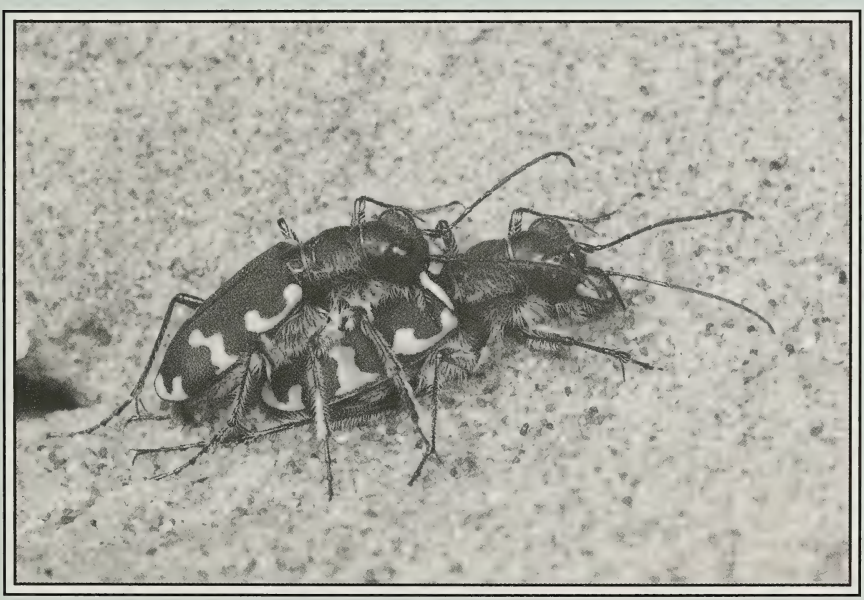

BRITISH ENTOMOLOGICAL & NATURAL HISTORY SOCIETY

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The Society arranges a programme of talks on Saturdays at various locations in Great Britain and a joint evening lecture with the LNHS in London in September. In addition, workshop meetings are held at the Society's headquarters and the well-known ANNUAL EXHIBITION takes place in the autumn. The 2011 Exhibition is planned for Saturday 5 November at Imperial College, London SW7. Frequent Field Meetings are held at weekends in the summer. Visitors are welcome at all meetings. The current Programme Card can be obtained on application to the Secretary, J. Muggleton, at the address given below.

The Society maintains a library and invertebrate collections at its headquarters in Dinton Pastures, which are open to members on various advertised days each month. The Society's web site, http://www.benhs.org.uk, has the latest news.

Applications for membership to the Membership Secretary: D. Young, 22 Wordsworth Close, Saxmundham, Suffolk IP17 1WF. Tel: 01728 603568.

Subscriptions and changes of address to the Assistant Treasurer: R. D. Hawkins, 30D Meadowcroft Close, Horley, Surrey RH6 9EL.

Non-arrival of the Journal, faulty copies or other problems arising from distribution of the Journal or notices to the **Distribution Secretary**: A. J. Halstead, 17 Highclere Gardens, Knaphill, Woking, Surrey GU21 2LP. Tel: 01483 489581 (evenings).

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Society Website: www.benhs.org.uk for recent information on the Society's meetings programme and general society details.

Cover photograph: Mating pair of Northern Dune Tiger Beetle, *Cicindela hybrida*, Sefton coastal sand-dunes, 16 May 2010. Photo: Philip Smith.

NOTE: The Editor invites submission of photographs for reproduction on the front covers of the journal. The subject matter is open, with an emphasis on aesthetic value rather than scientific novelty. Submissions should be in the form of colour or black and white digital images (jpg or tiff format) with a minimum resolution of 1275 pixels (i.e. 4.25 inches @ 300dpi).

THE DERBY ARMS WITHERSLACK, CUMBRIA: AN ENTOMOLOGICAL WATERING HOLE AND ITS HISTORICAL ASSOCIATION WITH THE SILVER-STUDDED BLUE *PLEBEJUS ARGUS* SSP. *MASSEYI*

John Phillips

Maytime, St Peters Road, Northney, Hayling Island, Hants PO11 ORT
s.jw.phillips@btinternet.com

'Witherslack hath many charms
Best of all is the Derby Arms'.

So ran a little rhyme underneath a rather crude picture of moths which hung until recently in the lounge bar of The Derby Arms Inn, Witherslack, Cumbria; this fact being the introduction to a most informative and entertaining article on the entomological pleasures of the area penned by Dr Neville Birkett FRES, entitled 'What at Witherslack?' (Birkett, 1959).

The Derby Arms Inn

The Derby Arms Inn is well known in the Cumbria area and has been used by myself as well as other entomologists before me as a recommended base for operations and also quite often as a convenient stopping over point on the way for entomological expeditions further north to Scotland. The public house is located three miles north-east of Grange-over-Sands, just off the A590 to Ulverston (OS Ref. SD 441 830) and now close to the M6 Motorway; the entomologist's basic requirement for a good beer and food being apparently well-served by this conveniently positioned establishment.

Numerous articles over the years in the entomological literature document the attractions of the surrounding wet heathland Mosses particularly in respect of the then existence of the attractive form of the Silver-Studded Blue *Plebejus argus* (L.) ssp *masseyi* Tutt, including Massey (1895), James (1904), Tutt (1909), Lister (1919), Wright (1942), and more recently Birkett (1959) amongst others; although as Birkett documents the Lepidoptera of the area, specifically the moths, as being extremely diverse and therefore an attraction in their own right.

In more recent times, The Raven Entomological and Natural History Society held field meetings centred on the Derby Arms. Richard Underwood in his book *The Raven Society – Fifty Years* published in 1996, mentions the Society's founder, Gerald de Courcy Fraser spent many a weekend at the Derby Arms with family and other members of the Society and that Meathop Moss and Black Toms Lane came in for a great deal of attention when staying there.

The Derby Arms (Fig. 1) takes its name from the Earldom of Derby the establishment being situated within the surrounding Halecat Estate at Witherslack; the family name being Stanley. The estate originally formed part of a reward given by Henry VII to Thomas Stanley for his support in the suppression of Lambert Simnel's abortive attempt on his throne. Simnel presented Henry with the first major challenge of his reign, Simnel then a boy of ten was used by others to attempt to re-assert the House of York's claim to the throne due to his striking similarity to the sons of Edward IV – the Princes in the Tower. Whilst there was even the slightest doubt that the two princes were not dead, those who supported the Yorkist's always

Fig. 1 Derby Arms, Witherslack. From a pre-1910 postcard. The board on the left advertises 'Accommodation for Tourists, including breakfast, dinners and teas at any hour.'

had a chance of rallying around someone to challenge King Henry, the first of these being Lambert Simnel. The subsequent 16th Earl of Derby gave his son Oliver Stanley the estate of Witherslack as a wedding present at which time Witherslack Hall was built.

The pub was built in 1821 on the old turnpike road, which was the main road between Kendal and Ulverston and was sold in the 1930s by the 17th Earl's son whilst Conservative MP for Westmorland and Minister of State for War. In the 1970s the whole complex was the regional depot for Watneys the brewery firm and it was subsequently sold to Vaux, from thereon the establishment appeared to fall into somewhat of a decline, however it has recently undergone a complete re-furbishment and is back to its former glory.

My first conscious recollection of the pub was in July 1989, when many convivial evenings were spent with Ray Cook, David Young and John Scanes all members of The British Entomological and Natural History Society as well as other well-known suspects in the 'Arms' discussing future expeditions; and over and above the alcoholic induced haze I happened to noticed a photograph of a group of bygone collectors hanging over the bar (Fig. 2) and it has always intrigued me as to who the entomologists were and what the historical context was, and I always made a mental note to try and find out.

During further later visits to the Inn it was becoming obvious that due to so-called improvements and numerous changes of landlord the connections with entomology were likely to be lost, and thus on my way up to Scotland in 2001 I was kindly loaned the picture by the then landlord with his permission to copy it and at least perhaps preserve it for posterity, by publishing it in one of the entomological journals.

Fig. 2 Edwardian collectors assembled outside The Derby Arms, Witherslack. Circa 1904.

Subsequently I have established that fortunately the original photograph is still displayed in the refurbished pub and long may it remain so.

Despite every effort over the last few years I have been unable to trace the names of any of the entomologists figured in the photograph. However, thanks to the Witherslack Hall Equestrian Centre and a copy supplied by them of the 1901 Census, I have managed to establish that the likely date of the photograph is slightly later i.e. 1904. The non-entomological figures were all members of the Askew family, with John Askew being listed as Inn Keeper and Butcher/Employer; the others being members of the family plus the odd servant/lodger.

Michael Salmon, in his most entertaining and thoroughly recommended book *The Aurelian's Fireside Companion – An Entomological Anthology* (2005) included the photograph which I had supplied under the heading 'Witherslack and Ambleside A Century Ago', the text being reproduced from an article by Russell E. James in *The Entomologist's Record* of 1904, but the author was himself unable to identify any of the collectors figured.

As mentioned previously, Dr Neville Birkett's article in *The Entomologist's Record* of 1959 gives a very full account of the Lepidoptera to be found in the area at that time; whether this still continues to be the case is no doubt open to some speculation. Within his article he does mention some names: J. B. Hodgkinson and J. H. Threlfall of Preston (last third of the nineteenth century); Professor J. J. Lister (1919); and also the Kendal Entomological Society (1901), which may be relevant.

However, the object of this little excursion into print was to initially rescue for posterity the photographic record and perhaps remind some older entomologists of

their time spent at this well-known watering hole and any communications or additional information would be greatly appreciated.

Silver-studded blue *Plebejus argus ssp. masseyi*

It is certain and well-documented that since the last third of the nineteenth century the area was well-worked by visiting lepidopterists due to the variety of habitats that existed at that time, including the famous Mosses of Meathop and Foulshaw; one of the main attractions being the magnificent forms of the Silver-studded Blue *Plebejus argus* ssp. *masseyi*, unfortunately long since a distant memory (Plate 1, Figs 1–8).

According to A. E. Wright (1942), J.B. Hodgkinson appears to have been the first person to record *P. argus* (= *aegon* Denis & Schiffermüller 1775) from Witherslack on July 21 1856, but could not find any reference to the distinctive blue females. Massey was next to record the butterfly in 1892 and did note the fine female forms. He thought them to be *P. argus*, the same as those from Corsica and named these northern P. *argus* var. *corsica* (Massey, 1895). J. W. Tutt recognised the localised nature of the form and named it var. *masseyi* in his paper published in the *Entomologist's Record and Journal of Variation* (1909a) and subsequently in *British Lepidoptera* (1909b).

The *masseyi* form of the Silver-studded Blue was undoubtedly one of the main attractions of the area for lepidopterists, formerly occurring on the 'Witherslack Mosses': Meathop Moss on the south side of the Derby Arms, with Foulshaw and Nichol's Mosses to the east and south-west of the Inn, respectively (Fig. 3). The Holker Mosses (SD35774) situated further west along Morecambe Bay on the Levens estuary was another well-known locality for this butterfly and Lepidoptera in general. Ireland Moss (SD3384) at the bottom of the Rusland Valley near the Levens estuary was apparently another location for the butterfly.' (Steve Hewitt, *pers. comm*).

The exact date and cause of the final extinction of these populations is unclear. There appears to have been a general decline in the number of extant sites throughout the early twentieth century until the final population is said to have been lost sometime around 1940. A disastrous fire on Meathop Moss sometime during 1940 has been connected with the final extinction of the butterfly in Cumbria, although the species had apparently not been reported on the site for several years prior to this date (Steve Hewitt, *pers. comm.*).

Habitat loss through drainage, aforestation or cessation of active management of several of the Mosses is likely to have been a contributing factor in the butterfly's general decline. Wilson in his *Flora of Westmorland* (1938) states 'Witherslack Moss . . . South of Helton Tarn by the river Winster . . . there was formerly a peat bog known as Witherslack Moss but this has now been almost entirely drained. A heathy tract still remains', 'former extensive peat bog from the Lyth Valley to the Lancashire boundary near Low Meathop. Nearly all this bog land, which was about eight miles in length and covered ten square miles, has now been drained and converted into well tilled farm land. Some patches remain as heathy tracts, especially the parts known as Foulshaw Moss and Ulpha Moss, but they are partially drained by ditches and the characters of the flora have been considerably altered. A small area, covering about a third of a square mile situated north of the hamlet of Meathop still remains in a more or less aboriginal condition (i.e. Meathop Moss)'. Halliday in his *Flora of Cumbria* (1997) states that 'progressive drainage of the low estuarine mosslands of . . . Morecambe Bay . . . has resulted in a lowering of the level of the pasture land and a progressive drying out of the residual islands of peat, such as Meathop Moss, with

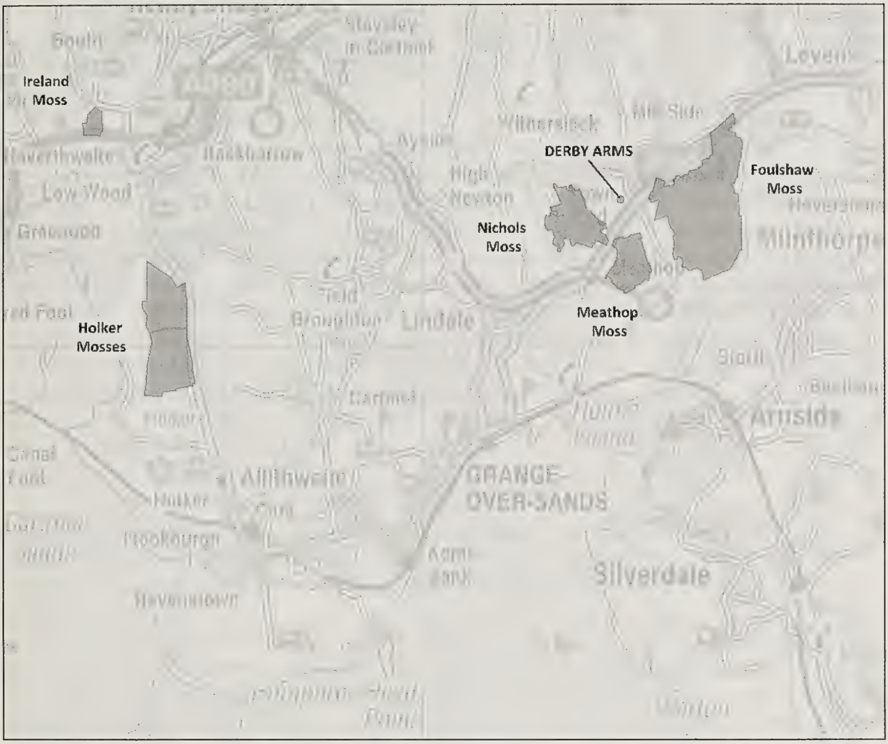

Fig. 3 The Derby Arms Inn and Witherslack Mosses, Cumbria. Prepared by Cumbria BRC.

the consequent accelerated invasion of the open moss by trees. Fire is an additional hazard causing deterioration of virtually all the raised bog surfaces which have escaped peat cutting'.

Collecting pressure on Meathop Moss, being so close to the Derby Arms, was no doubt intense at times and Wright (1942) was of the opinion that this may have caused the local extinction of the butterfly on this particular site. However, this does not explain its demise from other less well-known and less accessible areas.

Elsewhere, the butterfly remained relatively common on many of the other Mosses until about 1921 when it appears to have suddenly disappeared from many sites; Wright (1942) suggested a severe frost one May (no year given) as the possible cause of these losses. A population was rediscovered on an unnamed Moss in 1936 (Wright, 1942) and he implies that this was a small Moss within the Witherslack complex in Westmorland and states that the Lancashire populations were entirely gone.

Steve Hewitt, the Natural History Curator of the Tullie House Museum, Carlisle, who has been of considerable help in researching the history for this article, states that from the old national Butterfly Recording Scheme (BRC) a record exists for Nichol's Moss in 1939 which may be the 'small moss' that Wright refers to.

However, there are also general BRC species records for 1939 from Meathop, Holker, Witherslack, Ireland and Foulshaw Mosses, none of which according to

Wright held Silver-studded Blue by this date. So it may be that these BRC records refer to a list of sites where the butterfly formerly occurred prior to 1940 without inferring that it occurred at all on any of them up to that date.

The most recent Cumbrian specimen held by the Tullie House Museum is dated 1921, thus supporting Wright's account of its demise thereafter.

From the above it would seem that once again lack of timely conservation measures has contributed in no small part to the loss of this beautiful form of this insect. Ford (1945) intriguingly suggests that limited conservation measures may have been undertaken at a late stage as he understood 'that it (*masseyi*) has been increasing again owing to the protection which it is now given'. No information supporting this statement has been found and it is likely that the butterfly's demise occurred during the final drafting of his classic New Naturalist book. There is no doubt that the heyday of Victorian and Edwardian collecting also contributed to the butterfly's ultimate demise; however, in the final analysis, habitat loss and destruction as in most cases must be considered to be the major cause (Wilson, 1938; Halliday, 1997).

Pattern variation

Wright (1942) mentioned that subspecies *masseyi* exhibited considerable variation (Plate 1, Figs 1–8). 'The male uppersides vary from a light blue to a blue with a purple shade with a narrow whitish streak along the costa from base to three-quarters, occasionally to the tip. In many the black outer border is narrow; occasionally it is much wider, fringes white. The hind wings usually have a row of black spots near the margin . . . The usual colour of *masseyi* on the [male] underside is pale French grey, suffused with a steely blue tint . . . The underside spotting is similar to typical *argus* from the south of England . . . The [female upperside] is dull brown, of a darker shade than south of England examples.' Lister (1919) noted that the females 'are hardly ever without a wash or sprinkling of blue; the only race which resembles it in this respect being var. *corsica*, limited to that island.'

Wright described the hind wings as 'generally much more marked with blue than the fore wings . . . The [female underside] ground-colour is a warm brown, with the spots much more strongly marked than in the males, with a strong, clear and distinct greyish-white band between the submedian row of spots and the orange lunules.' He remarked that 'The effects given by the various combinations of blue and brown scaling are charming.'

J. J. Lister (1919) exhibited a series of *P. argus* ssp. *masseyi* Tutt collected in North Lancashire and Westmorland in July 1918 and 1919 at a meeting of the Entomological Society of London and compared the *masseyi* race with similar examples of the species from the New Forest, North Downs, Delamere Forest and Great Ormes Head and concluded that: 'The var. *masseyi* is thus a very varying form in the shade of blue in both sexes, in the degree of the blueness of the female, in the occurrence of the greyish borders of the uppersides of the wings in the male, and in the occurrence of a white submarginal border on the upperside of the hind wings of the female. It differs from other British forms in the frequent occurrence of a purer, less purple, shade of blue on the upperside of both sexes, and in the blacker shade of the ground-colour of the upperside of the female.'

Lister (1919) mentioned that specimens from Delamere Forest and Great Ormes Head showed intermediate forms between those from elsewhere in England and stated that 'it is doubtful if the species still exists at the latter locality.' i.e. Great Ormes Head. This statement seems somewhat strange as the form from this locality

now recognised as *P. argus* ssp. *caernensis* Thompson still occurs in good numbers on the 'Orme' to this day, the foodplants being the Rock Roses *Helianthemum nummularium and H. oelandicum* (Thomas, 1985).

Ecology

The ecology of the Cumbrian subspecies *masseyi* seems never to have been fully described. A. E. Wright, writing in *The Entomologist* in 1942, had found it fairly common but generally rather local when he first started recording 35 years previously in 1907; it seemed to frequent particular spots, whilst at other portions of the same Moss it would be absent although habitat and conditions appeared to be similar.

The late C. F. Johnson (see Wright, 1942), who had an extended knowledge of *P. argus* in the district, thought that its presence was due to the fact it frequented areas where the heather had been burnt some years previously and that probably the larvae appreciated the young growth. This agrees with Wright's own experience as the butterfly was generally found where the heather was short and seldom where it was long and rank (Wright, 1942).

J. J. Lister, when he visited in 1918 and 1919, was curious to know the foodplant, and could only suggest Bog Rosemary *Andromeda polifolia* which was present on all the many mosses he visited (see Wright, 1942).

Tutt (1909b) stated that the foodplant was quite unknown in the Witherslack district, but noted that there was an abundance of Bird's Foot *Ornithopus perpusillus* on the Mosses.

Wright (1942) had access to J. Davis Ward's diaries and quotes that he visited the Mosses on many occasions in order to watch the females lay, but with no success; he observed them usually sitting on bell heather. A captive female laid ova below the object they were affixed to and he thus assumed that in nature the insect was likely to deposit low down in the bushes. Ward also records in his diary that Lister was puzzled about the butterfly's foodplant which was said to be Bird's Foot, but this was not present where it flew. According to South (1906), it also fed on gorse, stating that Frowhawk had reared the butterfly on *Ulex europaeus* in captivity. J. D. Ward, himself, felt that either *Erica cinerea* or *E. tetralix* was the foodplant and not any other of the species suggested.

F. W. Frowhawk himself goes somewhat further stating that whilst in captivity the eggs are readily deposited on Furze *E. europaeus*, the larvae being reared on blossoms and tender shoots of this plant and on Broom *Cytisus scoparius,* but also suggests that in all probability in addition other natural food plants could be *O. perpusillus,* Heather *Calluna vulgaris,* Bell Heather *E. cinerea,* Petty Whin *Genista anglica* and Common Rest Harrow *Ononis repens* (Frowhawk, 1924).

More recent research on the ecology and distribution of *P. argus* by Professor Chris Thomas (1985) has shown that the species has specialized requirements: eggs are laid singly along vegetation/bare ground margins and larvae prefer tender plant tissues – buds, young leaves, growing tips and flowers. These requirements are met in early successional habitats as diverse as calcareous grassland, heathland, sand dunes and Mosses. These habitats are locally distributed as is *P. argus*. Regardless of biotope, the larvae tend to be polyphagous (on three plant families), but specialists on plant parts.

Larvae and pupae of lycaenid butterflies are often associated with ants: this is usually a mutualism in which ants guard lycaenids from natural enemies, and the lycaenid larvae and pupae provide sugars and amino acids for the ants. The association of ants with *P. argus* had been known since 1794 (Hinton, 1951), though

the significance of this finding in relation to the species occurrence in the UK was not well understood nor widely known by Victorian and Edwardian lepidopterists exploring the Mosses for the first time.

Jordano *et al.* (1992) showed that within habitat patches, *P. argus* eggs, larvae and pupae were all spatially associated with *Lasius* ants. Jordano and Thomas (1992) showed that the larvae were naturally associated with workers of *Lasius alienus* Förster s.l. and to a lesser extent *Lasius niger* (L.) s.l.. Unfortunately of course the opportunity to examine the specific requirements of the *masseyi* form on the Cumbrian Mosses has long since passed.

Large Heath *Coenonympha tullia* ssp. *davus*

The region to the south of the Lake District with its valley systems and close proximity to a wide variety of mild coastal habitats has attracted the attention of many passing entomologists over the years. Russel E. James (1904) refers to collecting Lepidoptera in and around the Derby Arms and notes various species encountered including the strongly spotted form of the Large Heath *Coenonympha tullia* Müller *(=t[i]phon)* ssp *davus* Fabr. stating that "I found *Coenonympha t(i)phon* Large Heath in great abundance and lovely condition – a week could be devoted to *C. t(i)phon* alone as the variation shown is most interesting – several including strongly in the same direction as *Epinephele janira* [Meadow Brown but presumably the Ringlet] ab *lanceolata*" (Plate 1, Figs 9–12).

This subspecies, restricted to northern lowland mosses, was more widespread in the early twentieth century, being known from Chartley Moss in Staffordshire, Delamere Forest in Cheshire and from several sites between Manchester and Liverpool in addition to the southern coastal plain of Cumbria. Drainage of its habitat, as in the case of *masseyi*, has been the main cause of its decline and it has a much more restricted distribution in the north-west today with Cumbria as an important stronghold. Russel James makes no specific mention of *C. tullia* at Meathop Moss but a strong colony of this butterfly still exists there today. The Moss is now maintained as a Cumbrian Wildlife Trust Reserve.

Despite all the land changes, The Derby Arms Inn at Witherslack today is still surrounded by a mosaic of interesting wildlife habitats ranging from heathland mosses, river valleys, low hills to coastal plains and well worth a visit. A good welcome can always be assured.

Acknowledgements

Firstly, my sincere thanks to the Witherslack Hall Equestrian Centre for supplying copies of historic photographs of The Derby Arms itself together with members of staff, and a copy of the 1901 census; to Steve Hewitt, Natural History Curator, Tullie House Museum, Carlisle, for his immense help in researching the history of ssp. *masseyi,* without which the majority of this article would not have seen the light of day; to Richard Underwood for details of the Raven Entomological & Natural History Society visits to Witherslack; Ron Groom for botanical information and to Professor Chris Thomas for information on the ecology of *P. argus*. Special thanks to Matthew Grose and Dr Teresa Frost of the Cumbria Biological Records Centre for producing the map; to Alec Harmer and Tony Pickles for allowing the use of specimens from their reference collections; and finally to Neville Birkett and his daughter Hilary. Their interest and encouragement has been greatly appreciated; this

article is therefore a modest tribute to Neville's contribution to the entomological heritage of the Cumbria area.

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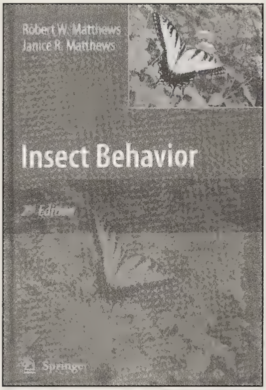
ANNOUNCEMENT

Auchenorrhyncha Recording Scheme for Britain and Ireland website

The Auchenorrhyncha are part of the Hemiptera or 'true bugs' and comprise insects commonly referred to as leafhoppers, planthoppers, froghoppers, treehoppers and cicadas. There are almost 400 species known from Britain and Ireland. A new website, *http://www.ledra.co.uk/*, has been developed by Alan Stewart and Tristan Bantock for those interested in studying and recording these insects. There are downloadable recording forms and a first issue of the LEDRA Newsletter (Leafhopper Distribution Recording & Analysis), aptly named after our largest species, the eared leafhopper *Ledra aurita* (L.). The Species tab alone is worth a look as it has colour photographs of all the 11 species that have been added to the British list in the past 20 years.

EDITOR



***Insect Behavior* (2nd ed.)** by Robert W. Matthews & Janice R. Matthews. 514 pp., 45 plates, 170 figures. (Springer Science + Business Media, 2010). Hardback *c*.£60. ISBN: 978-90-481-2388-9.

There are many publications covering the identification of insects and where they have been found. There are also a fair number providing pictures of insects; consider for instance, the plethora of coffee-table books covering Lepidoptera. There is, however, a noticeable dearth of affordable publications for those who are interested in what insects do, a problem that has been at least partially relieved with the recent publication of Insect Behavior (the spelling revealing its North American origin).

Focussing on the various ways in which insects react to each other and their environment, Insect Behavior aims to provide an introduction to basic behavioural concepts and processes. Key points and principles are illustrated by some 26 case studies, covering a range of families and behaviours.

Although references have an essential place in academic papers, when it comes to reference books they can be a hindrance and unless used sparingly they can disrupt the information flow. Recognising the downsides of referencing, the authors decided not to include citations in the text. To aid those who wish to explore the various topics in other publications, the case studies include the key participants and figure references are provided in a credits section at the end of the book. Omitting references was an extremely good choice, with the text reading well and key points being able to be digested without interruption.

The book starts with an introduction to, and a history of, the field of insect behaviour, covering the development and likely future directions of the four contributing disciplines: ecology, ethology, physiology and psychology. The second chapter describes the two internal communication systems (nervous and endocrine) which govern and regulate an insect's responses to external stimuli, thereby establishing the basic principle that behaviour in the insects takes the form of a set of preset responses; a principle which forms the backbone of the book. Interaction with, and movement within, the landscape are then discussed, covering locomotion (terrestrial, aquatic and aerial), dispersal, migration, thermoregulation, foraging and feeding. This is followed by an exploration of the use of passive and active defence messages as methods of staying alive long enough to reproduce. Inter-species communication is essential if reproduction is to take place, as is the reception of signals from potential predators. For this to happen, it is therefore necessary for insects to both send and receive messages and the various chemical, visual and mechanical communications methods necessary to accomplish this are covered in some detail. Should an insect survive this far, then reproduction can take place. This paves the way for a discussion of various courtship, mating and oviposition activities. The book concludes with a description of parental and social behaviours.

This book has, in my opinion, met the authors' objectives to help readers '. . . understand how a number of major behavioural responses function' and '. . . to gain insights into accessible ways in which behavioural research can be conducted'. Despite seemingly only being available in hardback format and hence priced a little on the high side, I feel that this book is well worth considering by those seeking an introductory text to insect behaviour.

JOLYON ALDERMAN

SEASONAL ABUNDANCE OF *CICINDELA HYBRIDA* (COLEOPTERA: CARABIDAE) ON THE SEFTON COAST SAND-DUNES, MERSEYSIDE

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Abstract

Analysis of 280 records of *Cicindela hybrida* L. on the Sefton Coast sand-dunes in 2010 demonstrate the temporal separation of two adult generations, with peak numbers in late April and late August. The conservation of this nationally rare insect is discussed.

Introduction

Cicindela hybrida L. (Northern Dune Tiger Beetle) is a rare species, confined in Britain to two coastal dunelands in northwest England: the Sefton Coast, Merseyside, and Drigg, Cumbria. Historically, it was also known from Wallasey (Merseyside), Carnforth (Lancashire), and the Isle of Walney and Eskmeals (Cumbria) but is now thought to be extinct at these localities. Past records from Cornwall, Norfolk and several sites in Wales seem to refer to the closely related *C. maritima* Latreille & Dejean (Judd, 2010). Reflecting its status, *C. hybrida* is classed as "Rare" in Red Data Book 2 (Shirt, 1987), revised to "Vulnerable" in a later review (Hyman & Parsons, 1992) and is a Priority Species in the UK Biodiversity Action Plan (BAP). This insect also benefits from a Species Action Plan in the North Merseyside BAP (Merseyside Biodiversity Group, 2001).

Cicindela hybrida is a highly thermophilous, narrowly adapted species, dependent on open habitats, high daytime temperatures and low humidity. Its ecology and behaviour have been extensively studied in Britain and on the European mainland, a literature review being provided by Judd (2003, 2010). He describes its desynchronised life-cycle, with two generations of adults in spring and summer, representing separate, co-existing populations, though differences in development speed and summer quiescence may lead some individuals to switch from one generation to another. The adult is active only during sunny weather, maintaining a body temperature of about 35°C by alternately basking and burrowing (Figs 1 & 2).

This spectacular insect has been known on the Merseyside coast since the 19th century, Ellis (1889) describing it as common on the sandhills on both sides of the estuary. Judd (2010) lists records in Sefton along a 15km stretch of sand-dunes from Blundellsands in the south to Birkdale in the north. Adults are characteristically found on bare sand patches, often south-facing, where they actively hunt small invertebrate prey by means of short, fast sprints; they also fly readily. Although he incorrectly named it *C. maritima*, Aldridge (1974) contributed greatly to our knowledge of this species on the Sefton Coast. At Ainsdale Sand Dunes National Nature Reserve, he recorded 37 adults in 1973 and 150 in 1974, established a sex ratio of 1:1 and confirmed the almost complete attachment of adults and larvae to bare, sandy habitats.

Fig. 1 Adult *Cicindela hybrida* near Cabin Hill, Sefton coastal dunes, 9 April 2010. Photo: Philip Smith.

Fig. 2 Close-up of *Cicendela hybrida*, showing biting mouthparts. Photo: Philip Smith.

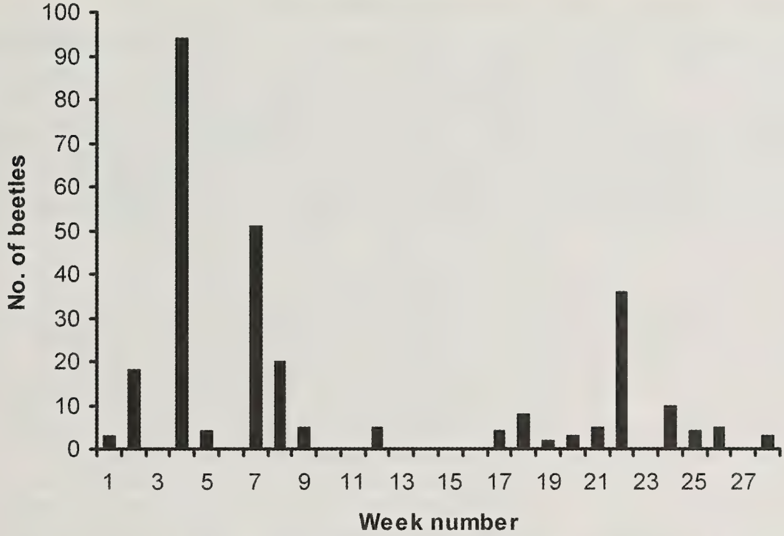

Fig. 3. Weekly totals of adult *Cicindela hybrida* on the Sefton sand-dunes from 9 April to 11 October 2010 (week 1 = 4–10th April).

2010 Observations

While conducting field studies on the Sefton dunes in 2010, dated records were kept of all adult *C. hybrida* seen, 10-figure National Grid References were taken by means of a hand-held GPS device and the habitat type was noted. A total of 280 individuals was recorded on 31 dates between 9 April and 11 October. To demonstrate the pattern of seasonal occurrence, these data are grouped into weeks in Fig. 3. Peak numbers occurred in late April and at the end of August, representing the two generations. There were no records from 27 June to 27 July, though field visits continued throughout this period. Sightings were made at intervals along the coast from Cabin Hill National Nature Reserve in the south (National Grid Reference SD293047) to Birkdale Green Beach in the north (SD303140), a linear distance of about 8.9km. All were on the bare sand of frontal or embryo-dunes, in blow-outs or on eroded sandy informal footpaths. The greatest number of records was on embryo-dunes on the southern section of Birkdale Green Beach. Here the beetles were found along a 400m length of dunes which are of recent origin, having developed since Green Beach began to form in 1986 but especially in the last 15 years (Smith, 2007). On this site, 177 individuals were noted (63% of the total), with a peak of 94 on 27 April. They were invariably found in sandy hollows or on bare slopes sheltered from the prevailing wind. Records were often of single individuals, but sometimes groups of up to five or six individuals were seen, usually a few cm apart. Aldridge (1974) states that the adults space themselves out but do not maintain individual territories.

It should be noted that these data were not collected in a targeted or systematic way, nor was search time standardised. However, the number of survey visits to the dunes in each month between April and October varied only between 18 and 24, with a mean of 21. Most visits were made in the early afternoon, usually lasting between two and three hours, so survey effort was relatively constant during the study period.

Discussion

The habitat in which *C. hybrida* was found accords with that described by Aldridge (1974) and Judd (2010). With his co-workers, the latter recorded small numbers in the southern extremity of the dune system between Blundellsands and Hightown, and to the north between Birkdale and Southport. During the present study, none was found in these areas despite the presence of suitable habitat. However, records of *C. hybrida* obtained by volunteers surveying Grayling butterfly *Hipparchia semele* (L.) in summer 2010 included two at Queen's Jubilee Nature Trail, Southport (SD323168), about 3km north of the present study's northernmost sighting (R. Burkmar *in litt.*, 2010). Further searches are required to establish whether the insect still occurs in the southern part of the dune system.

The three October records obtained during this study are by far the latest in the comprehensive database for this species maintained by the Local Records Centre, Merseyside BioBank. During his 1973/74 study, Aldridge's latest sighting was on 18 September. The earliest BioBank database record is 9 April 2007, coinciding with the first date in 2010, while Aldridge (1974) saw his first on 7 April. The gap in 2010 sightings from late June to late July is presumed to represent the time between emergences of the two adult generations and is not described by Judd (2003, 2010). Interestingly, Aldridge (1974) states that two out of 48 individuals that he marked survived from May to August 1973. His peak counts were in mid-May and mid-August, about two weeks later in spring and two weeks earlier in summer than in 2010, perhaps reflecting differences in weather conditions.

Evidently, 2010 was an exceptional year for *C. hybrida*, other observers on the Sefton Coast reporting unusually large numbers. This may have been due to a cold, dry winter, followed by the longest spring and early summer drought in northwest England since 1929. Other notable duneland insects seem to have benefited, including *Colletes cunicularius* (L.) (Vernal Mining Bee) and *Argynnis aglaja* (L.) (Dark Green Fritillary), these occurring in the largest numbers seen by the present author in 40 years' observations.

Conservation

As the Drigg population is declining, Judd (2010) suggests that the Sefton Coast may soon become the only known location for *C. hybrida* in Britain. Conservation of this nationally important population is crucially dependent on the maintenance of insolated bare sand. However, over recent decades the Sefton sand-dunes, in common with most other UK dune systems, have become increasingly stable, large stretches being overgrown by dense herbaceous vegetation and scrub (Smith, 2009). This is partly attributable to reduced livestock grazing and the demise of rabbit (*Oryctolagus cuniculus*) populations following the introduction of myxomatosis (Smith, 2009). An additional factor may be aerial deposition of nitrogen, which seems to be having a widespread impact on low nutrient-status habitats nationally (Jones *et al.*, 2004). In Sefton, mobile dunes are now largely confined to areas where active accretion is taking place, as at Ainsdale Sandhills and Birkdale Green Beach, or where recreational trampling damages the surface vegetation, such as at Formby Point (Smith, 2009). However, Judd (2003, 2010) emphasises that heavy trampling pressure is potentially damaging to larval habitat. Evidently, there is a difficult balance to be achieved, whereby recreational activity is sufficient to produce suitably sandy habitat but does not cause too much disturbance of the substrate. Integrated conservation management operations along the coast, such as scrub control, selective removal of pine plantations and reintroduction of livestock grazing are intended to

recreate more open habitats; these will benefit a wide range of specialist sand-dune biota, including *C. hybrida*.

Acknowledgements

The author is grateful to Steven Judd (World Museum Liverpool) and Richard Burkmar (Merseyside BioBank) for constructive and helpful discussions. Dr Burkmar kindly provided information from the BioBank database. Thanks are also due to Peter Gahan (Natural England) for tracing the Aldridge report in NE archives.

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BOOK REVIEW

Mayfly larvae (Ephemeroptera) of Britain and Ireland: Keys and a Review of their Ecology, by J. M. Elliot & U. H. Humpesch. 152 pp. Freshwater Biological Association, Publication No. 66. 2010. ISBN 978 0 900386 78 7. Price £27.00.

I am struggling to find a witty phrase using the word 'ephemeral' to include in my review of this publication. No, sorry, a word meaning 'short-lived' has no place here.

Professors Elliot and Humpesch have now been co-writers of three editions of FBA larval mayfly keys with their first two completed in 1983 and 1988 and the current one in 2010. The 22 year 'emergence period' between the 1988 and 2010 has not only resulted in a major update of research information in the ecological review but to three new mayfly species being added to the British and Irish checklist.

Let's begin with identification. Taxonomy of mayflies (as for most floral and faunal groups) is in a state of flux and increasingly so with molecular studies of phylogeny. The current key and overview has updated the number of British and Irish mayfly families to ten. *Ameletus inopinatus* and *Arthroplea congener* are now moved into new families (Ameletidae and Arthropleidae, respectively). Two new genera (*Serratella* and *Electrogena*) now appear compared with the 1988 key. And three species have been added to the British and Irish checklist *Electrogena affinis* (Eaton), *Caenis pseudorivulorum* Keffermüller and *Caenis beskidensis* Sowa.

The key will be very familiar to users of previous FBA larval mayfly keys, but new notes give additional features to aid species identification. The new additions to the

British and Irish checklist are included and recent taxonomic changes are covered with only minor changes to the layout of the 1988 key. A larger page size format for the book allows finer detail to be shown on the beautiful line drawings by Professor Mizzaro-Wimmer. The figures illustrating different species from the family Caenidae show the improvement in quality particularly well. Buy this publication now to see what I mean!

If you are new to mayfly larval identification this publication should be top of your list for accurate and correct identification. In addition to dichotomous keys there are concise flow diagrams showing gill and 'tail' features to guide you to family level identification, and both the line drawings and excellent colour photographs of larvae will give you confidence in your identification to family level and beyond. If your interest is in fly-fishing there is even a list of fisherman's names for mayfly species.

A glance through the extensive reference list in this publication will show that Professor Elliot was publishing research on invertebrate drift in streams in 1965 and Professor Humpesch on life cycles and growth rates of the mayfly *Baetis* sp. in 1979. Needless to say their knowledge of scientific research on the Ephemeroptera is not ephemeral (I managed to use the word!) and a phenomenal amount of information has been expertly reduced to 40 pages of figures, tables and text covering the ecology and applied aspects of the ecology of mayflies.

The ecology section covers habitats, habits and feeding behaviour, egg hatching, larval growth, larval biomass and production, life cycles and dispersal of larvae. There are tables throughout which neatly summarise species information and have been updated since the 1988 publication. The series of tables showing habitats, habits and feeding types has entries for all 51 mayfly species on the current British and Irish checklist. Recent work includes research on life cycle partitioning which explains how closely related species avoid competition for food and space in similar habitats by using different flight and hatching periods. And recent work has found that dispersal can be an active process for aquatic mayfly larvae with some larvae moving upstream and adults undertaking downstream dispersal. Adult flight of up to 1km has also been recorded from arctic streams suggesting perhaps a means of lateral dispersal between headwater streams.

The applied aspects of the ecology of mayflies summarises the use of mayflies in biotic indices related to water quality and chemistry, organic pollution, status classification for the Water Framework Directive, the impact of acidification and changes related to climate change. The importance of mayflies to productivity of waterbodies is covered (mayfly larvae may provide up to 25% of total zoobenthos production in cooler, unpolluted streams) and therefore their importance as a food source for fish and other vertebrates. And finally the current conservation status of mayflies is described. I was fascinated by some of the changes that have occurred between the 1988 and 2010 key. Acidification and its impact on invertebrates including mayflies was seen as a major issue in 1988, but much less so by 2010. Research on Welsh streams has shown considerable recovery from acidification with return of many acid-sensitive mayfly species to former habitats. Climate change was not mentioned in 1988 but is obviously a major issue and driver of current research. Interestingly an increase in winter precipitation associated with climate change is reported to increase the acidity of streams in Welsh moorland and forest habitats. Such changes could again impact the diversity of acid-sensitive mayflies that can survive in these areas. Recent research has also described a significant relationship between the growth and phenology of *Baetis vernus* and the North Atlantic Oscillation index. It is suggested that the North Atlantic Oscillation can affect water temperatures due to its effect on weather systems.

Who knows what changes will occur in the next 22 years?

KATHY FRIEND

OLIVE PSYLLID *EUPHYLLURA OLIVINA* (HEMIPTERA: PSYLLIDAE), A MEDITERRANEAN PEST OF OLIVE BREEDING OUTDOORS IN BRITAIN

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ABSTRACT

Euphyllura olivina (Costa) has been repeatedly found in Britain on imported olive plants at commercial plant nurseries, and in private and public gardens, since 1984. There have been no reports, however, of *E. olivina* breeding or overwintering outdoors in Britain. In July 2010 four olive trees planted outdoors at the Royal Botanic Gardens, Kew, Surrey, England were found to be infested with *E. olivina*. The trees had been imported from Italy in 2006 and it appears that *E. olivina* has been breeding and overwintering in southern England for four years. The host range, biology, geographical distribution, economic importance and British records of *E. olivina* are reviewed.

INTRODUCTION

The author observed six large mature potted Italian olive trees (*Olea europaea* L.) (Oleaceae) with apical twigs infested with the olive psyllid *Euphyllura olivina* (Costa) (Hemiptera: Psyllidae) at a commercial plant nursery in North Yorkshire, England, on 18 June 2010. There were live adults and early instar nymphs present. The plants were also infested with low numbers of oleander scale, *Aspidiotus nerii* Bouché, (Hemiptera: Diaspididae) and black scale, *Saissetia oleae* (Olivier), (Hemiptera: Coccidae), both of which are introduced pests that occur widely on indoor plantings in Britain. In order to determine the status of *E. olivina* in Britain the author contacted botanical gardens in England and Scotland to ask if they would examine olive plants for the psyllid. Sara Redstone, Plant Health & Quarantine Officer at the Royal Botanic Gardens (RBG), Kew, Surrey found psyllids on olive plants in the gardens on the 26 July 2010 and submitted samples to the Food and Environment Research Agency (Fera) for identification. Four trees that had been imported from Italy and planted in July and November 2006 were found to be infested with *E. olivina*. It therefore appears that the psyllid has been breeding and overwintering outdoors at Kew for four years, including the exceptionally cold winter of 2009/2010. Most of the psyllids were adult but there were small numbers of late-instar nymphs present. Andy Salisbury, Entomologist at the Royal Horticultural Society's Garden (RHS), Wisley, Surrey, did not find the psyllid on plants growing in the gardens, but found small infestations on two plants at the plant retail centre. The plants were bought in 2009, and at least one of the plants was propagated from a garden in London and was not imported.

The purpose of this communication is to clarify the status of *E. olivina* in Britain and to review its host range, biology, geographical distribution and economic importance. Slide-mounted specimens of *E. olivina* have been deposited at Fera.

Euphyllura olivina has previously been detected on many occasions in Britain on imported olive plants. All of the following records are on *O. europaea* imported from Italy at commercial plant nurseries collected by the Plant Health and Seeds Inspectorate (PHSI), unless stated otherwise.

ENGLAND: East Yorkshire, 21.v.1997, from Belgian stock, also 15.v.2009; Essex, Brentwood, 13.i.2005 (RHS); Hampshire, 15.xii.1997 (together with *Pseudococcus* sp. (Hemiptera: Pseudococcidae)); Lancashire, 27.i.2003, 23.v.2007; Lincolnshire, 9.iv.2008, 21.v.2007 from The Netherlands, 18.v.2009; Merseyside, Liverpool, International Garden Festival, Italian Garden, 1984 (Ian Hodkinson); Northamptonshire, college grounds, 15.vii.2005; Surrey, 3.ix.2004, 17.v.2000 (with *Thrips* sp. (Thysanoptera: Thripidae)), 16.vi.2005, Esher, 27.ii.2008 (RHS), London, 17.vii.2000 (RHS); West Sussex, from Cyprus, 27.v.1996 (with *A. nerii* and *Dasineura oleae* (Löw) (Diptera: Cecidomyiidae) galls and larvae), 16.iii.2005.

WALES: Carmarthenshire, National Botanic Garden of Wales, from Spain, 14.iv.1999.

SCOTLAND: Glasgow, 8.vii.2010 (Science and Advice for Scottish Agriculture).

Euphyllura olivina was also recorded in a nursery in London on an olive plant imported from Lebanon, iii.1982 (Seymour, Roberts & Davis, 1986). This is almost certainly a misidentification of *E. straminea* Loginova as *E. olivina* does not occur in Lebanon (Zeidan-Geze & Burckhardt, 1998).

Detection and identification

Infestations of the psyllid are usually first noticed by the conspicuous white waxy deposits produced by the nymphs on apical twigs (Plate 2, Fig. 1). The eggs (Plate 2, Fig. 2) are usually laid at the base of the leaves and are sub-elliptical, slightly narrowed apically, with a pedicel, pale yellowish in colour and about 0.3mm long. There are five nymphal stages (Plate 2, Figs 3–5) that vary in length from 0.4mm (first instar) to 1.5mm (fifth instar). In all nymphal instars the body is covered with a copious whitish waxy secretion (Plate 2, Fig. 3). The fifth instar is greenish with distinct blackish wing buds and posterior abdominal segments (Plate 2, Fig. 5). The adults (Plate 2, Fig. 6) are bulky in profile, robust, dull greenish grey to brownish grey, forewings partly clouded and speckled with yellowish brown, about 2.5mm long. They jump rapidly before flying.

There are four morphologically similar species of *Euphyllura* recorded feeding on olive: *olivina* (Costa), *pakistanica* Loginova, *phillyreae* Foerster and *straminea* Loginova. There has been much confusion in the literature between these species. For example, all four species have been recorded on olive in Iran but recent field surveys have shown that only *E. straminea* and *E. pakistanica* are present and that *E. olivina* and *E. phillyreae* are absent (Asadi *et al*., 2009). *Euphyllura straminea* has been frequently misidentified as *E. olivina* in Israel (Halperin, 1988) and Lebanon (Zeidan-Geze & Burckhardt, 1998); and *E. phillyreae* was misidentified as *E. olivina* in Greece (Lauterer, Prophetou & Tzanakakis, 1986).

Lauterer, Prophetou & Tzanakakis (1986) provide an illustrated key to identify the adults of *E. olivina*, *E. phillyreae* and *E. straminea*; Asadi *et al.* (2009) provide an identification table for the separation of the adults of all four *Euphyllura* species that feed on olive.

Host plants and biology

Euphyllura olivina feeds and develops on olive. It has also been recorded on Russian olive *Elaeagnus angustifolia* L. (Elaeagnaceae) and mock privet *Phillyrea latifolia* L. (Oleaceae), but these records may be based on confusion with other species.

Euphyllura olivina has seven developmental stages, egg, five nymphal stages and the adult. In the Mediterranean adults overwinter in crevices in the bark of olive

trunks and live for 2–3 months. They resume activity and mate in the spring; each female can lay up to 1000 eggs, either singly or in small groups on new shoots. The eggs hatch after 8–12 days. The nymphs feed on the plant sap and excrete honeydew on which sooty moulds grow. Nymphal development takes 24–35 days. It has two or three generations each year; the first during March and April, second in May and June, and third in September. The second generation aestivates in summer when the temperatures exceed 27°C (Bene, Gargani & Landi, 1997; Alford, 2007; INRA, 2010).

Natural enemies include the parasitoid *Psyllaephagus euphyllurae* (Masi) (Hymenoptera, Encyrtidae) (Chermiti *et al.*, 1986) and general predators such as Chrysopidae (Neuroptera), Miridae (Hemiptera) and Syrphidae (Diptera).

Geographical distribution

Euphyllura olivina occurs widely in the Mediterranean Basin and has recently been introduced to the USA (California since 2007). At least some of the records of *E. olivina* from the Middle East and Central Asia appear to be based on misidentifications. *Euphyllura olivina* is recorded from the Canary Islands (Spain), Corsica (France), France, Germany, Italy, Malta, Montenegro, Morocco, Portugal, Spain, Tunisia and the USA. It does not occur in Iran (Asadi *et al.*, 2009), Israel (Halperin, 1988) and Lebanon (Zeidan-Geze & Burckhardt, 1998).

Euphyllura pakistanica occurs in India (Thakur *et al.*, 1989), Iran (Noyes & Fallahzadeh, 2005; Asadi *et al.*, 2009) and Pakistan. *Euphyllura phillyreae* occurs in Algeria, Croatia, France, Greece (Lauterer, Prophetou & Tzanakakis, 1986), Israel, Italy, Slovenia, Spain, Turkey (Kovanc, Kumral & Akbudak, 2005) and the Ukraine. It does not occur in Iran (Asadi *et al.*, 2009). *Euphyllura straminea* occurs in Cyprus, Egypt (Elwan, 2001), Greece (Lauterer, Prophetou & Tzanakakis, 1986), Iran (Asadi *et al.*, 2009), Iraq, Israel (Halperin, 1988), Jordan, Lebanon (Zeidan-Geze & Burckhardt, 1998), Syria (Abou-Kaf & Hamoudi, 1999) and Turkey (Onucar & Ulu, 1991).

In addition to the species discussed above, there are a further ten *Euphyllura* species, distributed from Macaronesia to Nepal and in Africa.

Economic importance

The second generation of *E. olivina* is the most harmful, as it is associated with the new flowering and fruiting olive branches (Bene, Gargani & Landi, 1997). Feeding affects yield and the copious waxy secretions produced by the psyllid nymphs and the excreted honeydew can induce flowers to abort. Reductions in olive yield have been as high as 40–60%. Population densities greater than 20 nymphs per inflorescence can cause such losses (Johnson, 2010). Contamination with waxy secretions and honeydew, which serves as a medium for the growth of sooty moulds, also reduces the aesthetic value of ornamental olive trees.

Conclusions

The olive psyllid appears to have the potential to naturalise in Britain as it has been breeding outdoors on olive plants at the Royal Botanic Gardens, Kew for four years and has overwintered at the Royal Horticultural Society's Garden, Wisley. The winter of 2009/2010 was the coldest in southern England for decades but the psyllid survived outdoors. The demand for ornamental olive plants in Britain has increased

considerably in recent years, as Mediterranean-themed gardens have gained popularity. This is linked with climate change and (usually) milder winters enabling olive plants to survive outdoors more widely in the UK. The most significant change, however, has been the large scale planting of olives at two locations in England (Devon, Shropshire) and one in Wales (Anglesey) to produce fruit crops on a commercial scale. The import of olive plants from European Union member states is unregulated and whole ecosystems may be transplanted with large mature trees from the Mediterranean to Britain. This provides a clear pathway for the continual introduction of non-native olive pests. Examples of non-native insects detected in Britain in association with imported olives include: *Aonidiella aurantii* (Maskell) (Hemiptera: Diaspididae); *Dasineura oleae* (Löw) (Diptera: Cecidomyiidae); *Filippia follicularis* (Targioni Tozzetti) (Hemiptera: Coccidae); *Leucaspis riccae* Targioni Tozzetti (Hemiptera: Diaspididae); *Palpita unionalis* (Rossi) (Lepidoptera: Crambidae); *Parlatoria oleae* (Colvée) (Hemiptera: Diaspididae); *Prays oleae* (Bernard) (Lepidoptera: Yponomeutidae) and *Lepidosaphes flava* (Signoret) (Hemiptera: Diaspididae). No statutory action is taken when the olive psyllid is detected by the plant health authorities in England and Wales. As commercial olive production increases in southern Britain there is a risk that *E. olivina* could not only become widely naturalised but could become an occasional economic pest in Britain. The natural enemies of *E. olivina*, however, are likely to be introduced together with the psyllid and will help control the pest.

Acknowledgements

The author would like to thank Andy Salisbury of the Royal Horticultural Society for searching for the psyllid and permitting their records to be published; Sara Redstone of the Royal Botanic Gardens, Kew for searching for the psyllid and Ian Hodkinson for providing useful information on the presence of olive psyllid at Liverpool's International Garden Festival.

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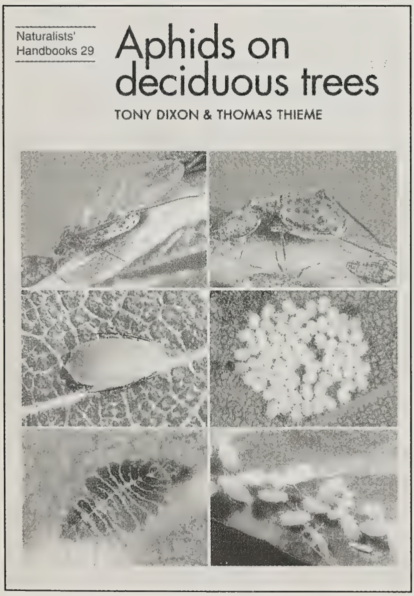

Naturalists' Handbooks 29: Aphids on deciduous trees by Tony Dixon & Thomas Thieme. First Edition. 138pp. The Richmond Publishing Co. Ltd, 2007. Softcover. £9.95. ISBN 978-0-85546-314-4.

An accessible, affordable, up to date guide to aphid biology, ecology and identification has long been wanting. Therefore, this addition to the Naturalists' Handbook series is most welcome.

The book is divided into nine chapters. Chapter one is an introduction and chapters two to seven cover topics in biology and ecology such as dispersal, distribution, feeding, natural enemies and reproduction. Chapter eight provides a key to identifying most deciduous tree dwelling aphids likely to be found in Britain and includes many figures and sixteen colour plates, each divided into six photographs showing a range of species in close up, *in situ* on their host, or their characteristic gall. Written descriptions of genera and species supplement the key. In keeping with other Naturalists' Handbooks, the final chapter considers applied study in the field and laboratory.

Although not without aesthetic appeal, aphids are small and do not show the diversity of vibrant colour and pattern typical of more popular groups such as

Lepidoptera. However, they do have fascinating, complex life-cycles, show intimate associations with their host plants and due to their relative immobility, are easy to observe in the field. The small print format and occasionally lengthy paragraphs typical of Naturalists' Handbooks do not always make for easy reading, but in sections two to seven of this book, the authors brilliantly summarise aphid natural history in less than fifty pages and give plenty of food for thought.

For the small number of species I have put through the key, it seems to work well, particularly combined with the excellent figures and written descriptions. Some photographs are disappointing with blurred images or poor colour reproduction. Perhaps more use could have been made of photographs showing aphids *in situ* on their hosts rather than close ups? Notable absentees from the key are *Periphyllus lyropictus* (Kessler) from *Acer platanoides*, *Tuberculatus querceus* (Kaltenbach) from *Quercus* and *Chaitophorus salicti* (Schrank) from sallows, whereas *Aphis fabae* Scopoli, *Aphis solanella* Theobald and *Aphis spiraecola* Patch are surprise inclusions given the 'shrubby' tendencies of their primary hosts.

Errors or inaccuracies are hard to find but ***Hap**locallis pictus* (p.45) should read ***Hop**locallis picta* (Ferrari). This species is known from a few suction trap records in England and is present in Wales on *Quercus ilex* (Baker, 2009). Following Blackman & Eastop (1994) as updated online at *http://www.aphidsonworldsplants.info* aphids keying to *Lachnus pallipes* (Hartig) on oak should probably be referred to *Lachnus longirostris* (Mordvilko) (not included in the key). Whilst *Chaitophorus populialbae* (Boyer de Fonscolombe) is described as an ant-attended species, observations from Wales (Baker, 2009) have shown it to be attended only occasionally. It should be noted that according to Blackman & Eastop (1994), *Stomaphis longirostris* (Fabr.) is not recorded from Britain, though it may well be present.

I enjoyed this book and would strongly recommend it to anybody with even a passing interest in aphids. One hopes it will stimulate more field observations and recording of aphids in Britain. Much research is done on the minority of aphids that can be considered crop pests, but most species do not warrant this negative label and basic information about their ecology is lacking, providing scope for important contributions to knowledge by amateur and professional naturalists alike.

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EDWARD A. BAKER

DISCOVERING THE RICH DIPTERAN FAUNA OF EXPOSED RIVERINE SEDIMENTS

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ABSTRACT

Once a neglected habitat, exposed riverine sediments (ERS) are now recognised as important sites for supporting rich invertebrate assemblages. Since 2005, Buglife – The Invertebrate Conservation Trust has driven forward work on the Dipteran fauna of exposed riverine sediments. This article outlines the projects that have been undertaken, the results and their application to future work.

INTRODUCTION

Exposed riverine sediments (ERS) are found on rivers throughout England, Scotland and Wales. These habitats are characterised by shifting banks, bars and islands of bare stones and sand on the river's edges. For a long time the invertebrate richness of these areas was overlooked but an increasing body of research has highlighted the importance of these invertebrate communities, initially for Coleoptera and now for Diptera.

Motivation for the work

A significant body of work had been collated on the Coleoptera of exposed riverine sediments (Eyre & Luff, 2002; Sadler, 2005). In 2005, driven by a need for knowledge on three UK Biodiversity Action Plan (BAP) species of Diptera that were found on exposed riverine sediments, Buglife successfully secured funding to investigate the Diptera assemblages of these habitats.

The species of particular interest were the Northern silver stiletto-fly *Spiriverpa lunulata* (Zetterstedt), the Southern Stilleto-fly *Cliorismia rustica* (Panzer) and the rare cranefly *Rhabdomastix laeta* (Loew). *Spiriverpa lunulata* is a moderately large, furry fly, easily recognised by the silvery males that glitter as they perform their winged dance in the sunlight. Both stiletto-flies (therevids) have distinctive long, thin, white, worm-like larvae, which are ferocious predators with a glossy hard skin that lets them slither through dry sand to pursue their insect prey. The third species initially selected for study, the cranefly *R. laeta*, is one of several species whose larvae live in the shallow water at the edge of sandy streams and rivers.

Since the initial investigation, Buglife has instigated a series of projects across the UK to obtain a better understanding of the importance of these semi-permanent, pioneer habitats for British invertebrates. These studies are described below.

Surveys in England, Scotland, Wales

From 2005 to 2006, four surveyors surveyed 18 rivers in England, Wales and Scotland, with 4 to 6 sites visited on each river. The two principal microhabitats that were sought at each point were bare wet margins and drier, higher deposited material with sparse ruderal vegetation. Methods used to record Diptera species included

structured sweep net sampling for 10 minutes to collect the broad assemblage of flies, with suction sampling at some sites, as well as casual sweeping of nearby vegetation plus direct searching for therevids. The rivers sampled during the project in England were the Rother, Wey, Monnow, Lune, Weaver, Bray, Coly, Exe, Mole, Yarty, Beamish, Coquet, Glen and the Till. Rivers in Wales were the Ysgir and the Usk. Rivers in Scotland were the Spey and Tay.

Survey results

The two stiletto-fly species were found several times, greatly extending the area where these rare stiletto-flies were previously known to occur and providing numerous new records. For the Southern silver stiletto-fly, *C. rustica*, new sites were found on the rivers Wey and Rother, and it was recorded for the first time in Scotland from the river Tay. The Northern silver stiletto-fly *S. lunulata* was found to be numerous and widespread on the Spey and Tay in Scotland, and outside Scotland there were new records for the rivers Lune, Coquet, Till and Beamish. As a consequence the decision was taken to remove *S. lunulata* from the BAP priority list. The results of this work helped to show that exposed riverine sediments in the UK support a remarkably rich assemblage of flies with a total of about 850 species, 87 of which were nationally rare or nationally scarce species. More importantly, six species new to Britain were discovered including: *Rhaphium suave* (Loew), *Hilara tenella* (Fallén) and *Hilara aartseni* (Chávla) (Drake, 2007a,b,c).

The species were given ERS fidelity scores based on the criteria given in Sadler & Petts (2000), Godfrey (1999) and information summarized in conservation reviews. Scores for ephydrids were based on Martin Drake's expertise.

Eleven species of fly showed complete fidelity, 20 strong fidelity and 54 moderate fidelity. Looking at the location of rivers that supported the most species with high fidelity scores, the Welsh and Northumberland rivers supported most, whereas the Lune, Spey, Rother, Wey and Weaver supported the fewest ERS species. When assessing classifications of Diptera assemblages, three ecologically meaningful groups were distinguished, and these were present on all the surveyed rivers apart from one or two small ones. Key environmental attributes determining these classifications were proximity to the water's edge, vegetation cover and shade. Wet exposed riverine sediment at the river's edge proved to be the area richest in ERS specialists and included most occurrences of several species with complete ERS fidelity as well as supporting large numbers of common shoreflies. In comparison the dry and often vegetated sediments were poor in ERS specialists but usually rich in uncommon species and represented the transition zone to dry habitat. Further analysis indicated that geographical locality may also be a strong influencing factor. These results highlighted the importance of the various micro-habitats found on exposed riverine sediments for supporting important Diptera assemblages.

Cheshire focused work

In 2007 and 2008, a detailed survey was completed on exposed riverine sediments in Cheshire by Steve Hewitt and John Parker specifically to establish the distribution of the Southern silver stiletto-fly *C. rustica* in the county. The rivers surveyed were the Bollin, Dane, Etherow, Tame and Goyt. An appreciable number of new records of *C. rustica* were obtained from all rivers surveyed, indicating that Cheshire is a stronghold for the fly and the county is an important area for its future conservation (Hewitt & Parker, 2008a).

Taxonomic confusion over the two *Rhabdomastix* species

More critical examination of the British specimens of the cranefly *R. laeta* collected during the various previous surveys revealed that it had been misidentified and the correct species name was *R. japonica* (Alexander). The true *R. laeta* (Loew) was collected for the first time in Britain on a sandy Devon river in 2005 by Martin Drake during an Environment Agency survey and the identity of the specimen was confirmed during the Buglife project. As a result of these findings a decision was made in 2007 to replace *R. laeta* with *R. japonica* on the UK Biodiversity Action Plan list.

Habitat assessment work in the North West of England and Wales

In 2008/2009 Buglife completed another piece of research on aquatic shore-line invertebrates. This project looked at developing a means of recording the characteristics of river-exposed sediments and assessing the sediment's ability to support important invertebrates. As a result the quality of river shores for invertebrate could be easily assessed and monitored (Hewitt & Parker, 2009b). This method was also tested on high quality exposed riverine sediment sites in Wales using funding from the Countryside Council for Wales (Hewitt, Parker & Kindemba, 2010). This work is still in progress as there proved to be such a wide variation in 'high quality' exposed riverine sediment sites in different parts of England, Wales and Scotland, and so this variation needs to be understood better. However, with further development we hope that this method will eventually be used more widely.

Impacts on exposed river sediments

A preliminary report assessing the impact of gravel extraction on invertebrate communities of exposed sediments along rivers in the North West showed that there were significant deleterious effects on both Diptera and Coleoptera, particularly on species with poor colonising ability (Hewitt & Parker, 2009c). However, a more detailed study is necessary to accurately assess the situation, and appropriate survey sites and funding need to be obtained.

Next steps and future management

All the data and information from these projects have been collated and fed into the wider conservation work on exposed riverine sediment habitats found in the UK. The continuing work of Buglife and others on the invertebrates of these temporary habitats has revealed a whole new field of study and highlighted pressing conservation issues.

Acknowledgements

Thanks to Craig Macadam for his help with this article. Buglife acknowledges the technical expertise and hard work of those who participated in the surveys, namely: Steve Hewitt, John Parker, Martin Drake and Andy Godfrey. Also for their wisdom and guidance on exposed riverine sediments, Jon Sadler (University of Birmingham), Adrian Fowles (Countryside Council Wales), Mike Williams (Environment Agency) and Matt Shardlow (Buglife). Funding for these projects was provided by the Environment Agency, Countryside Council for Wales, Natural England, Scottish Environmental Protection Agency and the John Lewis Spedan Trust Fund.

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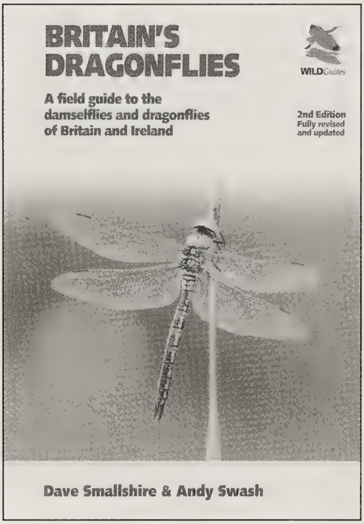

Britain's Dragonflies. A field guide to the damselflies and dragonflies of Britain and Ireland. Revised edition by Dave Smallshire & Andy Swash. 2010. 208pp, 290 illustrations and 66 maps. Softback with plastic cover, 150mm × 215mm. £17.95 each (plus £2.00 p&p). ISBN: 978-1-903657-29-4. Published by WILDGuides Ltd, P.O. Box 680, Maidenhead, Berkshire, L6 9ST, https://www.wildguides. co.uk, Sales enquiries email sales@ wildguides.co.uk.

Buy this book; even if you have little interest in odonates, it is a work of art in the identification of an insect group. This second edition is a full revision, with an extra 40 pages jammed packed with useful information and stunning colour photographs of all the UK species, plus a few of the more likely vagrants. There are easy-to-use identification charts for both adults and larvae. Each species has a two page spread, one of text and maps, the other of photographs showing males, females, immatures and colour forms. The detailed species profiles coverer adult identification, distribution (with up-to-date maps), flight periods, eggs and larvae, behaviour, habitat requirements, status and conservation. There are also sections on biology, habitats, recording and monitoring schemes, legislation, tips on how and where to watch and photograph dragonflies.

Darren Mann

PRIMARY AND SECONDARY PARASITOIDS OF *MACULOLACHNUS SUBMACULA* (HEMIPTERA: APHIDIDAE): *PAUESIA MACULOLACHNI* (HYMENOPTERA: BRACONIDAE) AND *EUNEURA LACHNI* (HYMENOPTERA: PTEROMALIDAE) NEW TO BRITAIN

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ABSTRACT

Two hymenopterous parasitoids associated with the rose aphid *Maculolachnus submacula* (Walker) are newly recorded from England (Hampshire). *Pauesia maculolachni* (Starý) is a primary parasitoid, known to be widespread in continental Europe. *Euneura lachni* (Ashmead) is a hyperparasitoid, widespread in the Holarctic, and known from many aphidiine hosts, though recorded here for the first time from *P. maculolachni.*

INTRODUCTION

Maculolachnus submacula (Walker) is a very distinctive lachnine aphid specific to rose (*Rosa* spp) and very widespread in the Holarctic (Doncaster, 1961; Fauna Europaea, 2004). In February 2010 a number of parasitised specimens were collected in a garden in Farnborough, Hampshire. Within a few days of their collection and maintenance at approximately room temperature, two specimens of a chalcidoid pteromalid emerged. These were identified as *Euneura lachni* (Ashmead) using the key by Graham (1969). Since no reference specimens were present in the Natural History Museum collection a specimen was sent to Dr Hannes Baur (Bern, Switzerland), a specialist pteromalid taxonomist, who confirmed the identification. Because *E. lachni* is known mainly as a parasitoid of aphidiine braconids, particularly those in the genus *Pauesia* (Noyes, 2003), it seemed probable that a primary parasitoid host was also present. The probable candidate was *Pauesia maculolachni* (Starý), also hitherto unknown from Britain. In July 2010 a number of parasitised specimens of *M. submacula* collected from the same locality yielded eight specimens of *P. maculolachni* (4 females, 4 males). These specimens were identified by the author using keys by Starý (1960, 1966).

Diagnoses and figures of the two species are provided below in order to facilitate future recognition of these new elements of the British aphid parasitoid fauna.

Family Braconidae: Aphidiinae

Pauesia maculolachni (Starý)
(Fig. 1, Plate 3, Figs 2–7, Plate 4, Figs 8–9)

Paraphidius maculolachni Starý, 1960: 19–20.

Diagnosis: Colour (Fig. 1): Head largely black, central face brown; mandibles (Fig. 3) yellow, palps brown. Mesoscutum (Fig. 2) yellow-brown with black areas on the central and lateral dorsum, and lower mesopleuron (Fig. 1). Legs and metasoma yellow-brown, metasoma darker distally, ovipositor sheaths (Fig. 7) black.

Morphology: Head transverse, wider than thorax at tegulae (Fig. 2); face broad, gena as long as half longitudinal eye-diameter (Fig. 3). Maxillary palps 4-segmented, labial palps 3-segmented. Antennae filiform with 21–22 antennomeres. Mesoscutum

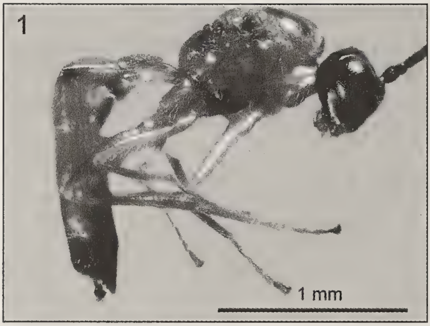

Fig. 1. *Pauesia maculolachni* female, lateral habitus.

with notauli distinct anteriorly (Fig. 2). Fore wing (Fig. 4) with strongly sclerotised pterostigma. Radial vein distinct, radial and median cells confluent, completed by fused intermedian and median veins on lower side, by interradial vein on external side. Propodeum (Fig. 5) with wide, concave central areola. First metasomal tergum (T1) (Fig. 6) with elongate rugulose sculpture. Ovipositor sheaths (Fig. 7) short, broad, curving upwards.

Material examined: 4♀4♂, ENGLAND: Hants, Farnborough 51°17.39′ N, 0°44.48′ S, 20.vii.2010 (J. Marshall) ex *Maculolachnus submacula* on *Rosa* (NHM).

Biology: Known only as a solitary, primary parasitoid of *Maculolachnus submacula*, pupating within the aphid, emerging from a circular opening posteriorly (Figs 8 & 9).

Distribution: Austria, Czech Republic, Finland, Moldova, Netherlands, Spain, Sweden, UK (Fauna Europaea, 2004).

Family Pteromalidae

Euneura lachni (Ashmead)
(Plate 4, Figs 10–13)

Pachycrepis lachni Ashmead, 1887: 193

Synonyms: *Euneura laeviuscula* Graham, *Pachyneura nawai* Ashmead, *Pachyneuron nazeeri* Mani (Noyes, 2003).

Diagnosis: Colour. Body metallic blue/green/black. Antennal scape brown. Legs brown, but all femora largely infuscate.

Morphology: Anterior part of clypeus (Fig. 11) deeply emarginate. Frons and face with predominantly reticulate sculpture. Fore wing (Fig. 13) with apical margin ciliate; basal cell bare or with a maximum of 4 setae (1 seta in Fig. 13); marginal vein clearly thicker at apex than at base. Metasoma (Fig. 10) dorsally convex.

Material examined: 2♀, ENGLAND: Hants, Farnborough 51°17.39′N, 0°44.48′S, ii.2010 (J. Marshall) ex *Maculolachnus submacula* on *Rosa* (NHM).

Biology: An obligate secondary (hyper-) parasitoid of aphids, mainly Lachninae, via various primary parasitoid species, mainly *Pauesia* species. It is not known whether *E. lachni* is a true hyperparasitoid (a koinobiont that attacks the primary parasitoid while it is still feeding) or a pseudohyperparasitoid (an idiobiont parasitoid of a post-feeding primary parasitoid), but it is likely to be the latter. A complete list of associated hosts (and geographical distribution) is available in Noyes (2003).

Distribution: Europe: Czech Republic, Germany, Italy, Netherlands, Sweden; U.K. Asia: China, India, Iran, Japan, Kirgizia, Korea, Pakistan, Russia; Nearctic: Canada, U.S.A. (Noyes, 2003).

Comments

Although recorded from the U.K. here for the first time, it is very probable that both species have been long present, but overlooked. Many parasitoids of Sternorrhyncha are very small and difficult to identify. In the author's experience,

PLATE 1: *Plebejus argus* ssp. *masseyi*. Fig. 1: ♂, Witherslack, 19 July 1919, C. F. Johnson; 2: ♂, Kendal District, 17 July 1915, (T.S.); 3: ♂ underside, Witherslack, 1895, B. H. Crabtree; 4: ♀, Witherslack, July 1900, H. Massey; 5: ♀, Witherslack, 1900, H. Massey; 6: ♀, Kendal District, 17 July 1915, (T.S.); 7: ♀, Witherslack, 19 July 1918, C. F. Johnson; 8: ♀ underside, Kendal, 20 July 1916. Kendal and Kendal District may refer to Foulshaw Moss, based on data from another specimen. Figs 1–4, 6–8, A. S. Harmer, 5, A. J. Pickles Colls. *Coenonympha tullia* ssp. *davus*. Fig. 9: ♂ underside (typical), Meathop Moss, 3 July 1968, A. D. A Russwurm; 10: ♀ underside (typical), Meathop Moss, 30 June 1969, A. D. A. Russwurm; 11: ♂ underside ab. *lanceolata*, Meathop Moss, 30 June 1969, H. G. M. Middleton; 12: ♀ underside ab. *lanceolata*, Meathop Moss, 6 July 1968, H. G. M. Middleton; from the A. D. A. Russwurm collection.

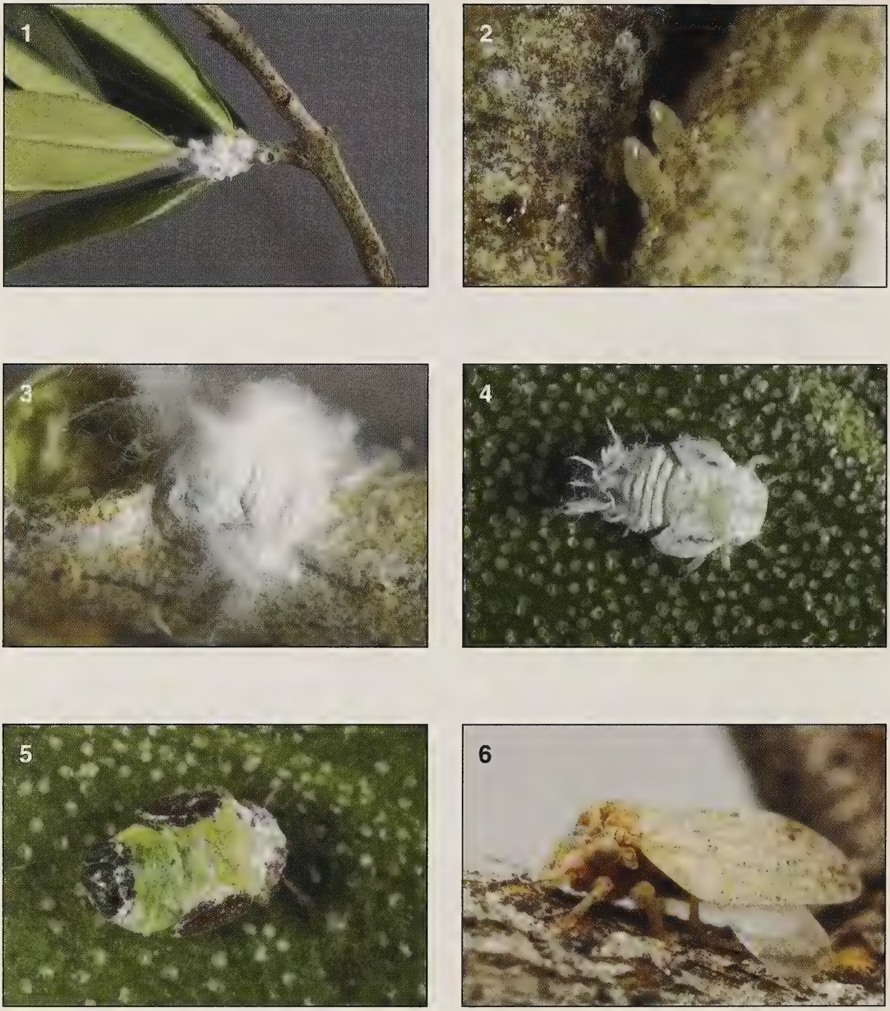

PLATE 2: Figs 1–6. *Euphyllura olivina*: 1: infested olive twig; 2: eggs; 3: fourth nymphal instar; 4: fourth nymphal instar with wax removed; 5: fifth nymphal instar with wax removed; 6: adult in profile [Photographs Crown copyright, Fera].

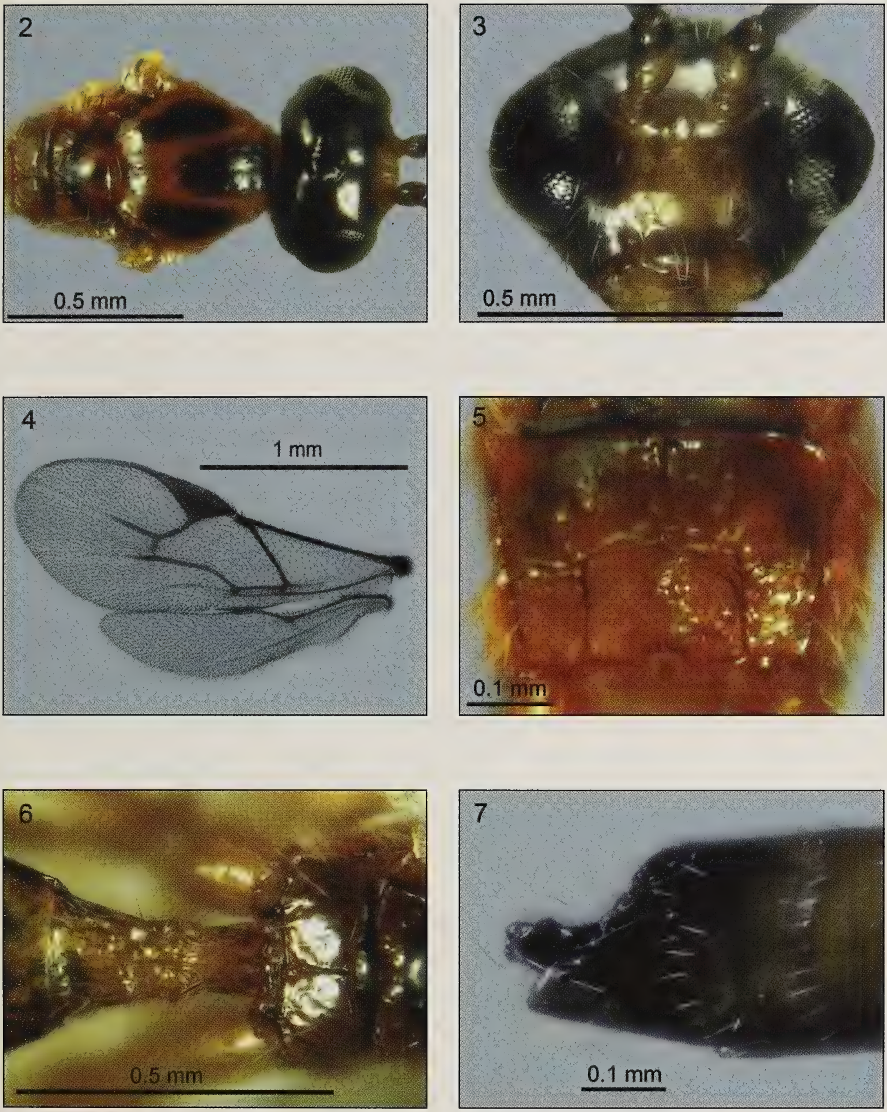

PLATE 3: Figs 2–7. *Pauesia maculolachni* female. 2. dorsal head and mesosoma; 3. head; 4. wings; 5. propodeum; 6. T1 of metasoma; 7. ovipositor sheaths, lateral.

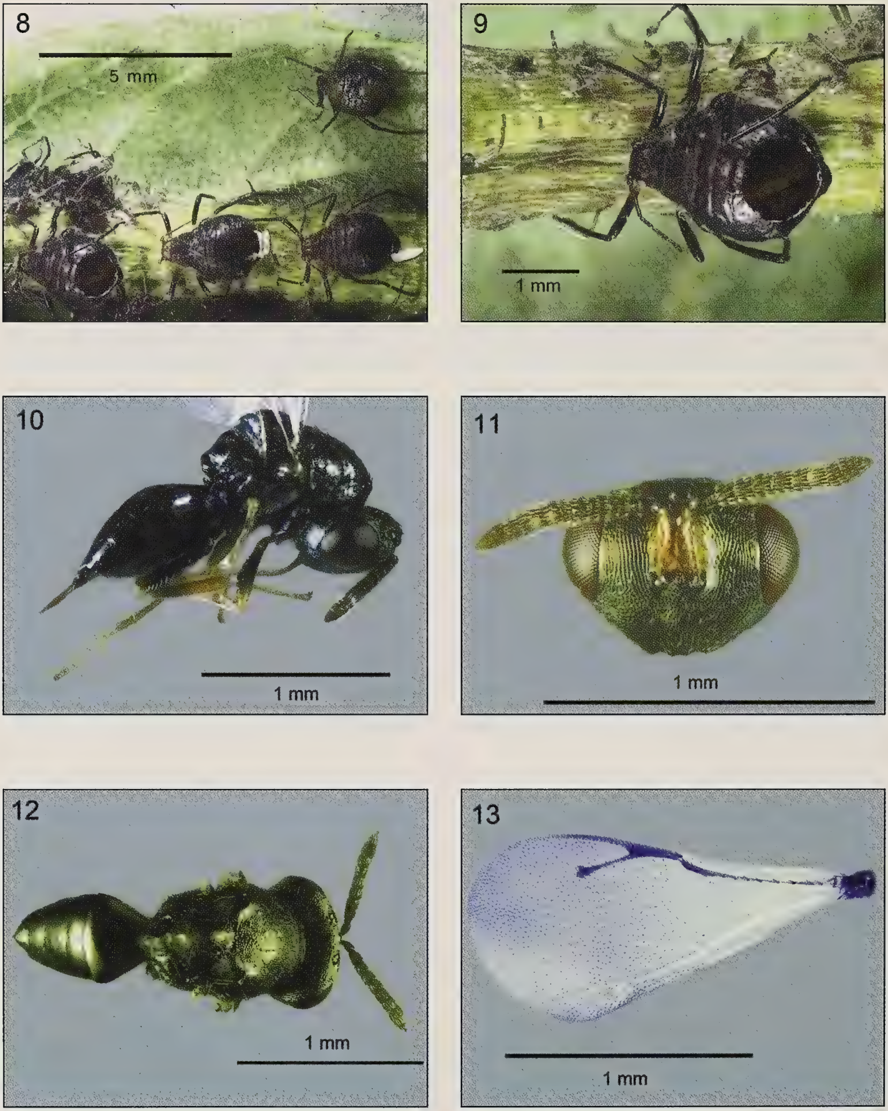

PLATE 4: Figs 8–9. *Mauculolachnus submacula* mummies, showing emergence holes of *Pauesia maculolachni*. Figs 10–13. *Euneura lachni* female. 10. lateral habitus; 11. head; 12. dorsal habitus; 13. fore wing.

a relatively small effort in rearing parasitoids of aphids, whiteflies and other Hemiptera is often rewarded with emergent species that are either new for a particular fauna, or very often completely new to science. Given the increasing importance of Sternorrhyncha primary parasitoids as potential biocontrol agents, further efforts to document the parasitoids associated with particular species should be encouraged.

Acknowledgements

The author is very grateful to Mrs Judith Marshall (Scientific Associate, Department of Entomology, Natural History Museum, London) for collecting both lots of parasitised aphids and bringing them to my attention. I also thank Hannes Baur (Bern, Switzerland) for confirming my identification of *Euneura lachni*. Gavin Broad and John Noyes kindly made improvements to an earlier draft.

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SHORT COMMUNICATION

A record of *Hylaeus pectoralis* Förster (Hymenoptera: Apidae) in Kent. – On 01.vii.2010 a male *Hylaeus pectoralis* emerged from a gall of *Lipara lucens* Meigen (Diptera: Chloropidae) that had been collected at Shorne, Kent (TQ6870) on 04.i.2010. This solitary bee species builds its nests in the vacated galls and is confined to stands of *Phragmites australis,* the host plant for *L. lucens*.

Following its discovery in Britain in 1900, *H. pectoralis* was found only at wetland sites in East Anglia. However in 1972 the species was found in Hampshire by G. Else and subsequently also found in Dorset, Essex, Surrey and West Sussex. (Else, 1995, *British Journal of Entomology and Natural History* **8**: 41–47). *Hylaeus pectoralis* has not previously been reported from Kent (Allen, 2009, *Bees, wasps and ants of Kent*). However, as there have been a number of recent records from south Essex then perhaps it is not surprising that the species should now be found in north Kent (Essex Field Club, www.essexfieldclub.org.uk [accessed 10 January 2011]). – M. T. Jennings, 206 Lower Higham Road, Gravesend, Kent, DA12 2NN.

OBOLODIPLOSIS ROBINIAE (DIPTERA: CECIDOMYIIDAE) NOW ESTABLISHED IN KENT

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Abstract

The distribution of the recently introduced gall midge *Obolodiplosis robiniae* (Haldeman) in Kent is reported. Infestation levels on false acacia *Robinia pseudoacacia* were low, with one and rarely two leaf-roll galls per leaflet. Limited observations suggested that the golden-leaved form, f. Frisia was less susceptible to attack. Most infestations occurred at 1–2m above ground level.

Introduction

In 2005, Skuhravá and Skuhravý reviewed the spread of the cecidomyiid *Obolodiplosis robiniae* (Haldeman) across Europe and postulated that it might soon appear in Britain. This species produces a leaf roll gall on false acacia *Robinia pseudoacacia*, a widely cultivated tree of urban gardens in the UK. The cecidomyiid, like its host plant, is native to north-eastern parts of USA, and has recently appeared in Europe from the USA. Leaf roll galls on *Robinia* were first noticed in north-eastern Italy in 2003 (Duso & Skuhravá, 2003) and soon afterwards in the Bolzano district (2004) and subsequently at a number of localities including Prague in the Czech Republic in 2004 (Skuhravá & Skuhravý, 2004). It has since spread to Germany, France, Hungary, Czech Republic, Switzerland, Poland and the Ukraine (Skuhravá & Skuhravý, 2007).

The species was eventually recorded in England by György Csóka from galls collected from the Botanical Gardens at Magdelen College, Oxford in July 2007 and from Wantage in July 2007 (Skuhravá, Skuhravý & Csóka, 2007). The species was subsequently recorded in the same year from Send, Surrey by Keith Harris (where a search for it in the previous year had failed) and Springfield Park and Russell Square, London by Brian Wurzell. Additional records from a number of localities have been received by the Royal Horticultural Society (Andrew Halstead, *pers. comm.*) indicating its continuing spread in southern England.

A population of *O. robiniae* was discovered in a garden at East Farleigh, near Maidstone, Kent (TQ735538) on 22 August 2010. Further records of this species in Kent were obtained in the following weeks. Quantitative counts of the infestation on *Robinia* at the original site are reported here.

Methods

The infestation of *O. robiniae* was studied on two mature specimens of *Robinia pseudoacacia* and a large number (15) of (0.5–1.0m) suckers in the garden at East Farleigh. Visual counts were made of the number of leaf roll 'galls' per leaflet pair for the 8 leaflet pairs of each pinnate leaf. Height distribution of the 'galls' was determined by counting the number of infested leaves per 10 leaves (10 replicates, combining data from both trees) using a pair of 10×45 optical binoculars to record counts at 1m intervals to the tops of the trees. Counts were made of the number of

galls and no attempt was made to determine whether more than one larva was present in each leaf roll.

Results

Kent Distribution

VC16: East Farleigh (TQ735538), 5.ix.2010; Perry Woods (TR045584) 22.viii.2010; Selling (TR045563) f. Frisia, negative, 22.vii.2010; West Maidstone (TQ748562) 17.ix.2010; West Maidstone (TQ748561, f. Frisia, negative, 22.vii.2010; VC15: Mount Ephraim (TR066603), old trees, positive, f. Frisia negative; and the same for *R. pseudoacacia* plants for sale, 19.ix.2010, Faversham recreation ground (TR019610)19.ix.2010; Faversham cemetery (TR025607) 24.ix.2010.

Searches for *O. robiniae* were confined to areas around Maidstone and Faversham simply because these localities were visited most often. The records show that wherever false acacia is grown there is now a reasonable chance of finding the cecidomyiid *O. robiniae*. Levels of infestation were generally low and not easily discernible, but a few trees in both areas supported reasonable infestations. Three *Robinia* f. Frisia, with golden-coloured leaves were examined but no galls of *O. robiniae* were found.

Occurrence on plants

Leaf roll galls of *O. robiniae* were found on every leaflet pair, from the basal pair (1) to the apical pair (8) (Table 1). Most galls were found on the middle leaflets with no apparent difference in galling frequency between leaflets 2–7. The lowest numbers of galls were found on the basal and apical leaflets. The number of galls per leaflet pair ranged from 1 (90%) to 2 (10%) (Table 1).

The infestation levels on both *Robinia* trees were relatively low and so the data were pooled (Table 2). Fifteen suckers, several up to 1m high were examined but none showed any signs of damage by *O. robiniae*. Highest frequencies of galling occurred on the lower foliage at 1–2m above ground and it was noticeable that there were virtually no galled leaves on the upper foliage ($\chi^2 = 8.86$, $P < 0.01$).

Discussion

The limited searches for *O. robiniae* have shown that the fly is fairly widespread and therefore likely to be established throughout large parts of Kent where its host plant has been cultivated. From the evidence available its spread across Kent has taken about three years. It was interesting to note that the few specimens of the golden form of false acacia inspected were *Obolodiplosis*-free, including a very mature tree at Mount Ephraim. It is not known whether this form is susceptible to the cecidomyiid in its native range in North America. Certainly more specimens of this form need to be examined to determine whether there is a real difference in susceptibility of *Robinia* cultivars to *O. robiniae*. It is possible that the golden yellow leaves are less nutritious in terms of chlorophyll content or the secondary compounds present are deleterious and thus avoided. This could be investigated quite simply by caging adult flies onto both cultivars to see if egg laying and gall development takes place. It was also interesting to note that two *Robinia* plants brought to Mount Ephraim for a Plant Heritage sale were infested with the cecidomyiid, indicating a much wider distribution of the species and if bought and planted locally would contribute to the species range expansion.

Table 1. Frequency of leaf-roll galls of *Obolodiplosis robiniae* on false acacia, East Farleigh, 2010

Leaflet number	No. of galled leaflets	No. of galls per leaflet
1 (base)	1	1
2	4	5
3	3	3
4	4	5
5	5	5
6	4	5
7	3	3
8 (apex)	2	2

The total number of galled leaves examined = 29.

Table 2. Plant height and frequency of *O. robiniae* leaf-roll galls

Sample height (m)	No. of galled leaves (n = 10)	Mean no. of galls per leaf
4	0 0 0 0 0 0 0 0 0 0	0
3	0 1 0 1 0 0 0 0 0 0	0.02
2	6 0 0 1 1 0 0 2 1 0	0.11
1	0 0 5 2 1 1 0 1 0 1	0.11
0	0	0

The life stages of *O. robiniae* are illustrated in colour in Skuhravá, Skuhravý & Csóka (2007) and it is interesting to note that in the Czech Republic, there are three generations per year with each gall containing 5–6 larvae on average. It is not yet known how many generations of this fly occur each year in the UK. Although only one to two galls per leaflet were encountered in the present study, Plate 2 Fig. A of the publication shows that up to four galls per leaflet, involving almost all of the leaflet's entire perimeter is possible. These observations strongly suggest that we can expect much higher infestations of this cecidomyiid in future as it establishes itself in this country. The authors also discovered a platygastrine endo-parasitoid, new to science and it will be interesting to discover whether this is also resident (or has been introduced) in the UK.

Acknowledgements

The author wishes to thank Keith Harris for his advice on gall midges and references to previous publications on *O. robiniae*.

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SOUTHWOOD'S HETEROPTERA COLLECTION

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Abstract

The Oxford University Museum of Natural History (OUMNH) received the Heteroptera collection of the late Professor Sir T. R. E. Southwood. This formed the collection on which much of the book *Land & Water Bugs of the British Isles* was based. It contains many notable specimens and two paratypes of *Lygus wagneri* (Remane). It is now available for study.

Introduction

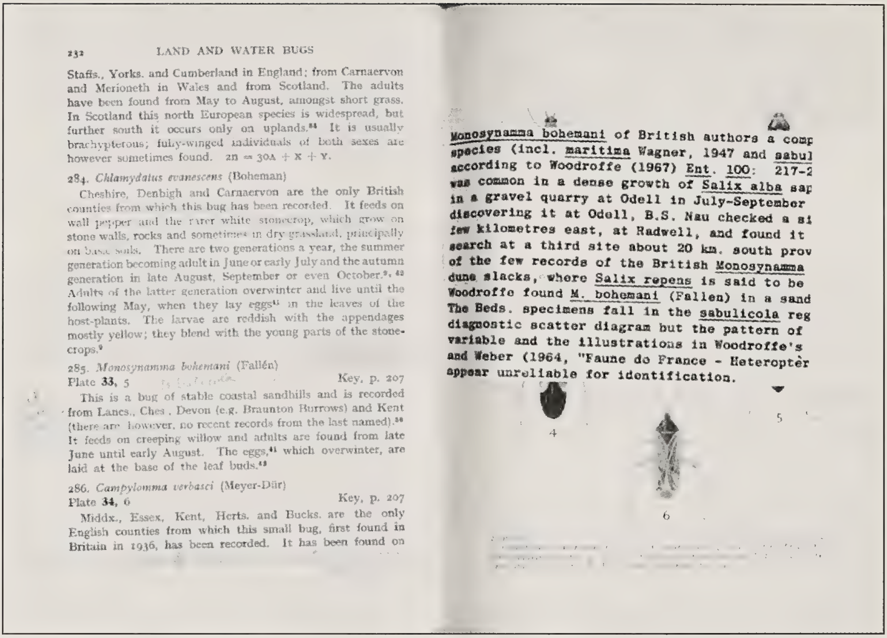
Professor Sir T. R. E. Southwood (1931–2005), an eminent entomologist and ecologist, donated his personal collection of Hemiptera: Heteroptera to the Hope Entomological Collections (HEC) at the Oxford University Museum of Natural History (hereafter referred to as OUMNH) shortly before his death on the 26 October 2005. This substantial collection of nearly 3,000 specimens has not only enlarged the existing Hemiptera collection at the museum, but it has also contributed several new notable species to the Hope Entomological Collections and two paratypes of *Lygus wagneri* Remane, 1955. Southwood's collection was used extensively for the *Land & Water Bugs of the British Isles*, the seminal work on the British Heteroptera, which was published with his co-author Dennis Leston (1917–1981).

This valuable addition to the Museum's collections has recently undergone remedial conservation work and has been incorporated into the British Collection, and is now available for study and loan.

Historical and current significance

A budding entomologist from the age of six (Badmin, 2006 & May, 2009), Richard Southwood had already written five scientific papers whilst still at school, a precursor to the 327 published papers and books that he would eventually have to his name (May & Hassell, 2008). Perhaps the most influential of his entomological works is *Land & Water Bugs of the British Isles*, a book that Southwood co-authored with Dennis Leston as part of 'The Wayside and Woodland Series' to replace a much out-of-date book by Edward Saunders (1892). Published early on in his career in 1959, the book uses diagrams, coloured plates and written descriptions that include ecological and geographical details to key out the British Heteroptera. In fact, Southwood's personal working copy of the book (presented to D. J. Mann by Southwood in 2005), received regular annotations and notes to keep it up-to-date (Fig. 1). However, despite the constantly changing nature of the field of taxonomy, the book has stood the test of time and remains to this day the main point of reference for heteropteran identification in the British Isles.

Undoubtedly many of the observations used to write this noteworthy book were taken from Southwood's personal fieldwork and his own collection. This testifies to



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Staffs., Yorks. and Cumberland in England; from Carnaervon and Merioneth in Wales and from Scotland. The adults have been found from May to August, amongst short grass. In Scotland this north European species is widespread, but further south it occurs only on uplands.[84] It is usually brachypterous; fully-winged individuals of both sexes are however sometimes found. 2n = 30A + X + Y.

284. *Chlamydatus evanescens* (Boheman)

Cheshire, Denbigh and Carnaervon are the only British counties from which this bug has been recorded. It feeds on wall pepper and the rarer white stonecrop, which grow on stone walls, rocks and sometimes in dry grassland, principally on basic soils. There are two generations a year, the summer generation becoming adult in June or early July and the autumn generation in late August, September or even October.[9, 42] Adults of the latter generation overwinter and live until the following May, when they lay eggs[41] in the leaves of the host-plants. The larvae are reddish with the appendages mostly yellow; they blend with the young parts of the stonecrops.[9]

285. *Monosynamma bohemani* (Fallén)
Plate **33**, 5 Key, p. 207

This is a bug of stable coastal sandhills and is recorded from Lancs., Ches., Devon (e.g. Braunton Burrows) and Kent (there are, however, no recent records from the last named).[58] It feeds on creeping willow and adults are found from late June until early August. The eggs,[41] which overwinter, are laid at the base of the leaf buds.[43]

286. *Campylomma verbasci* (Meyer-Dür)
Plate **34**, 6 Key, p. 207

Middx., Essex, Kent, Herts. and Bucks. are the only English counties from which this small bug, first found in Britain in 1936, has been recorded. It has been found on

Monosynamma bohemani of British authors a comp
species (incl. maritima Wagner, 1947 and sabul
according to Woodroffe (1967) Ent. 100: 217-2
was common in a dense growth of Salix alba sap
in a gravel quarry at Odell in July-September
discovering it at Odell, B.S. Nau checked a si
few kilometres east, at Radwell, and found it
search at a third site about 20 km. south prov
of the few records of the British Monosynamma
dune slacks, where Salix repens is said to be
Woodroffe found M. bohemani (Fallen) in a sand
The Beds. specimens fall in the sabulicola reg
diagnostic scatter diagram but the pattern of
variable and the illustrations in Woodroffe's
and Weber (1964, "Faune de France - Heteroptèr
appear unreliable for identification.

4

5

6

Fig. 1. Page 232 and a coloured plate from T. R. E. Southwood's own working copy of *Land and Water Bugs of the British Isles.*

the huge importance of his collection which, when used in conjunction with the book, can be used to identify most species found in the British Isles.

Collection composition

The Southwood collection contains 459 species of the 532 recognised British species of Heteroptera, representing almost every genus across the Hydrocorisae – fully-aquatic bugs (Fig. 2), Amphibicorisae – water-surface dwellers (Fig. 3) and Geocorisae – land-dwellers (Fig. 4).

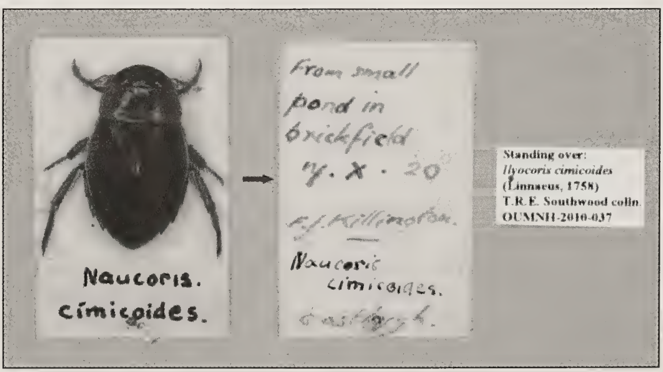

Fig. 2. *Ilyocoris cimicoides* (L.), Hydrocorisae.

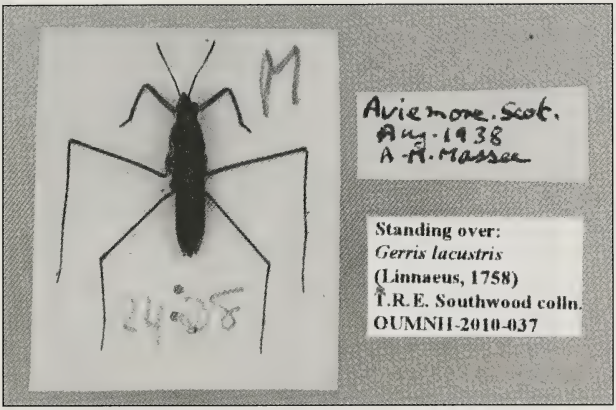

Fig. 3. *Gerris lacustris* (L.), Amphibicorisae.

The collection not only contains material collected by Southwood from across the British Isles, but also specimens collected by his contemporaries, including G. E. Woodroffe (1923–1975), A. M. Massee (1899–1967), S. H. Scudder (1837–1911) and D. Leston (1917–1981). Nine of the species in the Southwood collection were new to the HEC British collection, many of which have listed conservation status (see Table 1). Furthermore, the collection contains six of the eight species listed as Endangered (RDB1) in Kirby's (1992) review, namely: *Geotomus punctulatus* (Costa); *Gonocerus acuteangulatus* (Goeze); *Pyrrhocoris apterus* (L.); *Eremocoris fenestratus* (Herrich-Schäffer); *Physatocheila harwoodi* China and *Polymerus vulneratus* (Wolff).

Table 1. Species represented in T. R. E. Southwood's collection (Kloet & Hincks, 1964) new to the British Collection at the Oxford University Museum of Natural History. National Status Designation according to Kirby (1992).

Species	National Status Designation
Halticus macrocephalus Fieber, 1858	RDBK
Orthotylus virens (Fallén, 1807)	Nb
Agnocoris reclairei (Wagner, 1949)	Nb
Zygimus nigriceps (Fallén, 1829)	Na
Nabis pseudoferus Remane, 1949	Nb
Xylocoris flavipes (Reuter, 1875)	–
Psallus wagneri Ossiannilsson, 1953	–
Psallus masseei (Woodroffe, 1957)	–
Myrmecoris gracilis (Sahlberg, 1848)	RDB3

Although Southwood's collection contained predominantly British material, a few of the specimens were from mainland Europe e.g. *Pitedia juniperina* (L.) collected in the Pyrenees, Spain. The most significant of these foreign specimens are two *Lygus wagneri* (see Fig. 5). These were collected by Reinhard Remane in the Black Forest, Germany and form part of the Remane's paratype series described in 1955.

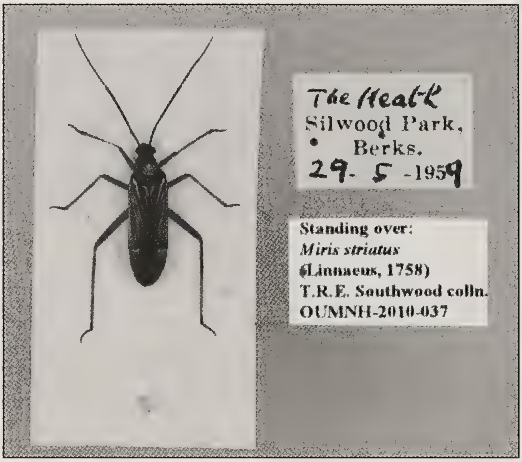

Fig. 4. *Miris striatus* (L.), Geocorisae.

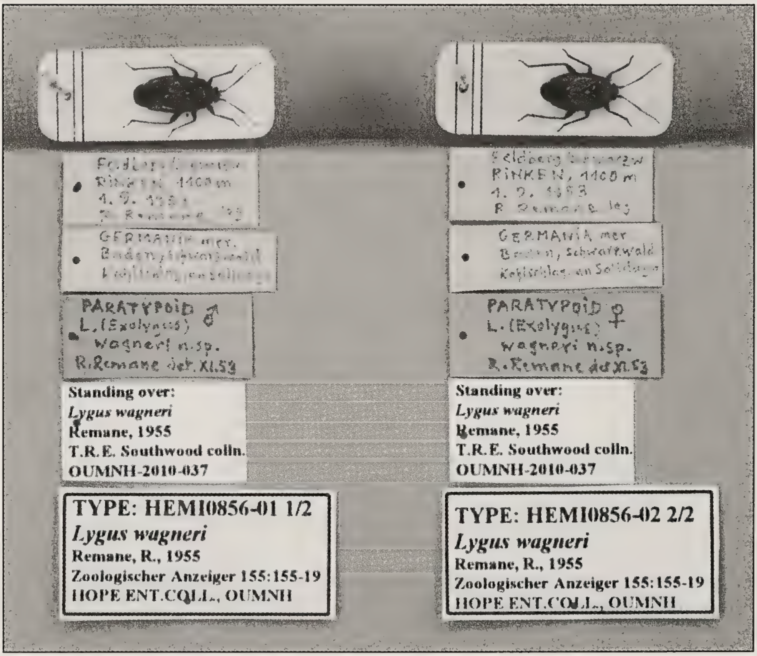

Fig. 5. 1 × male (left), 1 × female (right) paratypes of *Lygus wagneri* Remane, 1955.

Research potential

Professor Sir T. R. E. Southwood was highly renowned for his expertise in the Heteroptera, and it is clear from the contents and condition of his personal collection that he was also a skilled collector. The donation of his Heteropteran collection is a

valuable addition to the collections held at the Oxford University Museum of Natural History and to the field of entomology as a whole.

It is of further note that following the donation of the Oxford County Council collections of Hemiptera to the Museum, specimens of *Orthops basalis* (A. Costa, 1853) collected at Leckford in 1971 and Lambs Pool in 1988 by J.M. Campbell are now represented in the collection.

If you are interested in viewing Southwood's specimens then contact the Entomology Department, Oxford University Museum of Natural History at *entomology@oum.ox.ac.uk* or on +44 (0)1865 272978 to arrange loans or a visit.

Acknowledgements

The author would like to thank the following from Oxford University Museum of Natural History: Zoë Simmons and Darren J. Mann for their support, encouragement and comments on the manuscript; and Katherine Child for her photographic expertise. This work was carried out under the E.P.A. Cephalosporin internship grant.

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SHORT COMMUNICATION

Monaphis antennata **(Kaltenbach) (Hemiptera: Calaphidinae) parasitized by *Aphelinus subflavescens* (Westwood) (Hymenoptera: Aphelininae)**. – In August 2010 three nymphs of the rare birch aphid *Monaphis antennata* were found mummified on leaves of a cultivar of *Betula utilis* growing close to the 'Red Dragon Centre' in Cardiff Bay, Wales (Fig. 1). The mummies were black in colour and on separate leaves, with one on the lateral edge of the abaxial surface, one at the apex of the adaxial surface and the third at the apex of the abaxial surface.

Following storage at room temperature in clear plastic containers, three wasps emerged from the rear end of the mummies and were identified as species of *Aphelinus* Dalman. Andrew Polaszek at the Natural History Museum, London,

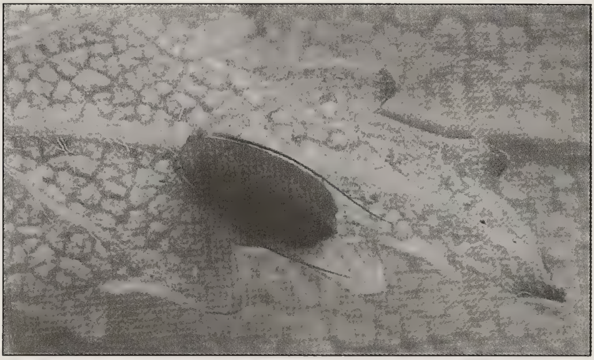

Fig. 1. Birch aphid *Monaphis antennata* parasitized by *Aphelinus subflavescens*. Photo: Ed Baker.

confirmed their identity as *Aphelinus subflavescens* (Westwood), a specialist parasitoid of tree-dwelling aphids in the Calaphidinae, including the *Betula*-feeding genera *Betulaphis* Glendenning, *Calaphis* Walsh and *Symdobius* Mordvilko.

Two members of the Aphidiinae are reported by Mackauer & Starý (1967) as parasitoids of *M. antennata*; *Trioxys mutilus* Mackauer, host specific and known only from the Netherlands and *Aphidius aquilus* Mackauer, a specialist parasitoid of Calaphidinae and Thelaxinae feeding on *Betula*, known from several European countries, including Britain.

I am not aware of any previous records of parasitized *M. antennata* in Britain and can find no records whatsoever of *A. subflavescens* parasitizing *M. antennata*. Since *A. subflavescens* is a specialist parasitoid of Calaphidinae, the record is not surprising, but work is required to establish how commonly *M. antennata* is selected as a host. *Monaphis antennata* does not form the dense colonies typical of most species in the Calaphidinae and is usually found as a single nymph, feeding cryptically at the mid-rib on the adaxial leaf surface or leaf petiole. According to Hopkins and Dixon (1997), feeding on the adaxial surface may be an adaptation to avoid predation, though nymphs undertake their final moult on the abaxial leaf surface. Many *B. utilis* close to the tree on which the *M. antennata* mummies were found hosted the *Betula* specific aphid *Symdobius oblongus* (von Heyden), feeding in small, dense aggregations on twigs, attended by *Lasius niger* (L.). Although no *Symdobius* mummies were observed, it is possible that this aphid was also being exploited by *A. subflavescens* as a host.

Aphelinus subflavescens is a tiny wasp, but careful field observation of colonies of Calaphidinae may throw light on its foraging strategies. The author would welcome records of the wasp captured amongst aphid colonies or reared from aphid hosts. – E. A. Baker, 10 Bron Avenue, Vale of Glamorgan, CF62 6PR.

Acknowledgements

The author thanks Andrew Polaszek for identifying the wasps.

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APHIS ROEPKEI (APHIDOIDEA) NEW TO BRITAIN

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Abstract

Aphis roepkei (Hille Ris Lambers) is reported new to Britain. Details are given on host plant, feeding position, attendance by ants, location of record and identification.

Introduction

Baker (2009) reported two aphids new to Britain, feeding on common herbaceous native plants in Wales. This paper reports a further addition to the British fauna, also found on a common herbaceous native plant in Wales. All three aphids are probably indigenous, but may have been overlooked due to their small size and discreet feeding positions.

Aphis roepkei (Hille Ris Lambers)

In June 2010 small, pale green aphids were collected by the author from the runners, base of leaf petioles, base of stems and beneath the flowering heads of creeping cinquefoil *Potentilla reptans* growing luxuriantly on stone chippings deposited on 'brown-field' land adjoining County Hall, Atlantic Wharf, Cardiff Bay. The aphids fed individually or in small clusters attended by *Lasius niger* (L.), with those feeding at the base of stems attended by small groups of ants and sheltered by soil brought above the stone chippings by the ants (Fig. 1), and those feeding on

Fig. 1. Soil shelters built by workers of *Lasius niger* to protect *Aphis roepkei*. Photo: Ed Baker.

aerial parts attended by individual ants whilst other ants ran rapidly along runners to investigate flowers and leaves, presumably searching for aphids or their natural enemies. Apterae and immatures were the dominant morphs, with a few alatae observed close to the base of stems. Specimens were difficult to collect as they were easily dislodged and rapidly dispersed when disturbed.

Following examination under a stereomicroscope, and using the key and information in Blackman & Eastop (2006) the aphids were identified provisionally as either *Aphis roepkei* Hille Ris Lambers or *Aphis subviridis* (Börner) and sent to the Natural History Museum, London for examination. Comparing them with material from Austria, Italy and Sweden, R. Blackman (*pers. comm.*) confirmed their identity as *A. roepkei* and provided the following comparative morphological data for apterae (Table 1).

Table 1. Morphometric data for *Aphis roepkei*. The figures for RIV + V/HTII refer to how many times longer the last segment of the rostrum is than the second segment of the hind tarsus and SIPH/CAUDA refers to how many times longer the siphunculi are than the cauda.

	RIV + V/HTII	SIPH/CAUDA
Co-types (Italy)	1.38–1.50	1.13–1.45
Austria	1.30–1.44	1.39–1.67
Sweden	1.20–1.33	1.09–1.60
Wales	1.23–1.45	1.47–1.74

The morphological differences shown by the data, such as the longer siphunculi of the Welsh specimens compared with the co-types, may be due to regional variation in this rather undispersive species.

The pale green colour of *A. roepkei* distinguishes it from other British *Aphis* on *Potentilla*. Its main host seems to be *P. reptans*, but it has also been collected on *P. argentea* and, in East Siberia, on *P. chinensis* (Blackman & Eastop, 2006). In addition to *A. roepkei*, *P. reptans* is listed as a host for the following *Aphis* species: *A. potentillae* Nevsky, *A. solanella* Theobald and *A. tormentillae* Passerini. None of these are likely to be confused with *A. roepkei*. *Aphis potentillae* occurs in Central and Eastern Asia and is very dark green or black (Blackman & Eastop, 2006). *Aphis solanella*, a polyphagous species closely related to the black bean aphid *A. fabae* Scopoli, is dull black, sometimes with white wax markings. *Aphis tormentillae* is greenish black, is not usually visited by ants, and feeds particularly on *P. erecta* (Stroyan, 1984). The only other British *Aphis* feeding specifically on *Potentilla*, *Aphis comari* Prior & Stroyan, is blue-green, very dark green or bluish black, and feeds on shoots and leaves of *P. palustris* (Stroyan, 1984). *Aphis subviridis* in Central and Eastern Europe is described as 'pale green' but is not recorded from *P. reptans*, its main host being *P. argentea*. *Aphis breviseta* Holman is bright yellowish green, but is known only from steppe localities in Eastern Europe, and not from *P. reptans* (Blackman & Eastop, 2006).

Fauna Europaea (*http://www.faunaeur.org*) records *A. roepkei* from the Czech Republic, Germany, Italian mainland, Poland, Slovakia, Sweden, the countries making up the former Yugoslavia and the regions of the East Palaearctic and Near East. Blackman & Eastop (2006) add Western Asia and Eastern Siberia.

Discussion

Preston, Pearman and Dines (2002) recorded *P. reptans* from most 10km squares in England and Wales. *Aphis roepkei* may have a similar general distribution, but may favour sites with luxuriant growths of its main host and plentiful attendant ants.

The aphids in Cardiff were mainly apterous and were observed to disperse between separate plants by walking along runners. Attendant ants may also move aphids. Alatae are likely to be very weak flyers that rely heavily on wind dispersal leading to a large element of chance in whether or not they land on a suitable host. Even if they land on *P. reptans*, local conditions such as a lack of attendant ants or insufficient numbers of host plants may lead to the failure of colonies.

Careful field work should provide more information on the distribution and ecology of *A. roepkei* and may also lead to the discovery of other aphid species with discreet feeding habits that are new to the British fauna.

Acknowledgements

The author is very grateful to Roger Blackman and Jon Martin at the British Museum of Natural History, London, for identifying the aphids and providing details of their morphology.

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Regional Meeting at University Museum of Zoology, Downing Street, Cambridge on Saturday 17 April 2010

Over 50 members and guests attended the first BENHS Regional Meeting in East Anglia (Fig. 1), on a fine sunny Saturday in Cambridge that would have been ideally suited to holding a field meeting if only the weather could be predicted a year in advance! The theme of this meeting was *Fenland Insects*, with three speakers invited to talk about different aspects of the history, ecology and future prospects of the fenland fauna. Brian Elliott (BENHS Vice-President) chaired the morning session and welcomed those present as well as giving an introduction to the Society and its current activities.

Ian McLean (Brampton) gave a talk on *Our Changing Fenland Insect Fauna*, a presentation jointly prepared with Peter Kirby (Peterborough), which gave an account of the history of fenland over the past 400 years and the changes observed in its insect fauna since the beginning of the nineteenth century, when the first records and specimens became available. He noted well-known species that have become extinct during this time, as well as the reasons why they have been lost, before summarizing what has survived and introducing the principal conservation techniques used to manage fenland habitats. Finally, he described survey techniques and a sampling protocol devised by Peter Kirby to assess changes in fenland insects over time due to habitat changes and other factors.

Paul Waring (Peterborough) was unable to give his talk *Habitat Requirements of Fenland Moths* due to being stranded in the United States by the consequences of the Icelandic volcanic eruption. Brian Eversham (Chief Executive, The Wildlife Trust)

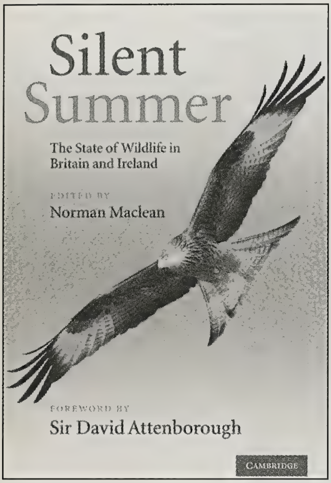
Fig. 1 Brian Eversham talking to Veronica Bennett and Paul Furnborough, with Dr Ailsa McLean in the background, during the refreshment break, Museum of Zoology, Cambridge.

gave a wide-ranging and inspiring talk *The Great Fen Project: New Opportunities for Fenland Insects*, which as well as giving many interesting insights into the natural history of fenland flora and fauna also looked forward to the restoration of over 3,700 ha of fenland habitats in the area between Woodwalton Fen NNR and Holme Fen NNR. He summarized the significant progress made so far and discussed how extensive restoration of fenland will benefit many characteristic species and give them better chances of coping with climate change and other human pressures in the intensively-used East Anglian landscape.

After lunch Brian Eversham chaired the afternoon session and introduced Louise Bacon (Cambridgeshire & Peterborough Biological Records Centre) who spoke on *Local Biological records centres and you: how and why we need local naturalists and what is the gain for them* giving an account of recent biological recording activities within Cambridgeshire and how these might be developed in future. This was an excellent background for the afternoon discussion on future recording in fenland, which ran in parallel with two successive tours of the insect collections in the University Museum of Zoology, led by Farnon Ellwood and Russell Stebbings. These tours showed the facilities available in the museum to visitors and researchers and a selection of the historic insect collections housed there. Subsequently to the BENHS Regional Meeting, a follow-up event organised by Louise Bacon under the auspices of the county records centre brought together leading recorders from within the county for many groups of plants and animals to consider further what field meetings and other activities will be organised in future to increase targeted recording within the county. This will help to meet the aspirations of many who spoke at the Regional Meeting about the desirability of achieving better organised recording within Cambridgeshire and surrounding areas. At the end of the afternoon, Brian Eversham thanked the speakers and organisers of the event, as well as our hosts in the Zoology Department, for the excellent facilities and the smooth running of the day.

IAN MCLEAN

BOOK REVIEW



Silent Summer: The State of Wildlife in Britain and Ireland. Edited by Norman Maclean. 765pp, (Cambridge University Press, 2010). Hard cover £27.99. ISBN 978-0-521-51966-3.

This book takes its name from an earlier best seller, *Silent Spring* by Rachel Carson who painted an idyllic picture of wildlife in harmony with its surroundings eventually silenced by modern farming practices. However life is far more complex in reality and prophesies prone to error. In fact today, people in industrialised countries are better fed than ever before and rushing around the countryside in ever-increasing numbers making a great deal of noise in the process – silent countryside it ain't. However this has largely been a one-way process versus nature, with towns expanding onto green field sites, endless road building and more efficient agriculture gradually and stealthily reducing the extent and quality of the rich diversity of semi-natural habitats that have evolved across Britain and Ireland since the last ice age. Degradation, reduction and loss of habitats and loss of animal and plant species appear to be reaching a critical phase and there is a distinct quietness to be heard in some corners of the countryside. This book is a timely review of the state of our wildlife today, ten years into the twenty-first century.

A similar review was attempted at the beginning of the new millennium, but at £150 a copy, failed miserably to reach its target audience and is rarely cited. This is to be deplored at it contained many important articles on British wildlife. The editor in chief of *Silent Summer*, Professor Norman Maclean, an Emeritus Professor of Genetics at Southampton University, with a strong interest in river management and wildlife conservation, has not made the same mistake, and has brought together national experts on a very wide range of taxa groups to summarise their knowledge succinctly in a hardback book at an affordable price (£28).

The good news for entomologists is that for once there are more chapters on insects and other invertebrates than the usual four-legged/feathery animals which tend to skew our perception of the natural world. We all know that watching wildlife programmes on television gives a very distorted view of the true wealth of animal and plant life on earth. Insects (and bacteria) dominate.

Factors driving changes in wildlife abundance are discussed first. Tim Sparks and colleagues set the scene with a chapter on 'Climate Change' and how this has affected species abundance, latitudinal and altitudinal shifts in distribution and phenology over recent decades. There are very informative papers on 'Agriculture, woodland and semi-natural habitats' by Ken Norris; 'Urbanisation and Development' by Kevin Gaston and Karl Evans; 'Water pollution' by Michael Hughes and Carl Sayer and the 'Impacts of hormone-disrupting chemicals on wildlife' by Charles Tyler and Rhys Goodhead. There are also chapters on the impacts of plant and vertebrate animal introductions which we are all familiar with and a fascinating account of recent trends and effects of recreational angling. The final chapter here entitled 'Twenty-five questions in ecology' is an abridged version of a longer paper on 100 questions of high policy relevance that I once tried reading in the Journal of Applied

Ecology. Some readers may find these questions stimulating: some are solvable, some are potentially enlightening, others I suspect are highly unlikely to achieve a correlation coefficient above 0.4 and thus of low predictive value.

The second section deals with conservation in action and summarises the progress we have made in implementing conservation measures across the UK (with some notable successes), our role in international conservation and in particular our government's responsibility for looking after globally rare and endangered species in UK Overseas Territories.

The third section, the real meat of the book, comprises 21 chapters and deals with the state of our wildlife, group by group. Vertebrates are split into mammals, bats, birds, fishes, reptiles and amphibians with a special chapter devoted to the conservation of the grey partridge. There are individual chapters on riverflies (Cyril Bennett and Warren Gilchrist), bumblebees (Dave Goulson), butterflies (Jeremy Thomas), moths (Butterfly Conservation and Ian Woiwod), dragonflies (Peter Mill, Steve Brooks and Adrian Parr), flies, beetles, bees, wasps and ants (Alan Stubbs), Hemiptera (Alan Stewart and Peter Kirby) and Orthoptera and allied insects (Judith Marshall). There is also a very informative paper on other invertebrates including spiders, harvestmen, woodlice and platyhelminths by Richard Chadd and Brian Eversham. Several chapters cut across taxa and cover habitats such as freshwater, the littoral zone, offshore waters, and a novel one on aerial plankton (Richard Harrington, Chris Shortall and Ian Woiwod). Declines and losses and increases and additions to each insect group are reviewed and discussed in relation to contributing factors such as habitat degradation, climate change, light pollution, water quality and pesticides and herbicides. The oft quoted amounts of pesticides used in our gardens are way out of date and clearly overstated, but acquiring commercial figures is difficult even for a former insider.

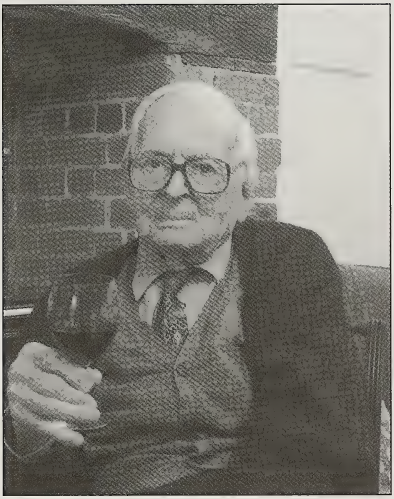
Much of what the authors have written about should be fairly common knowledge to anyone reasonably acquainted with their group of interest, but having all the information on so many groups in one place means that we can reach a much more balanced assessment of the overall state of our country's wildlife and this is the great benefit of this book. It appears we have lost far more native species than we have gained and that this process may be accelerating. Besides direct human impact, introduced species such as deer have deleterious effects at a range of scales and trophic levels, altering vegetational structure and composition and severely disrupting the abundance of associated plant herbivores such as insects and their parasitoids. Aquatic habitats are not immune: river systems are invaded by introduced crayfish and predatory fish. Fragmentation of the landscape and climate change also exert changes.

This book is a rich source of information about the state of our fauna and flora and a copy should find its way onto the bookshelf of every entomologist in the UK. With such knowledge we should be able to make better informed choices about the future management of our countryside. I, for one endorse Buglife's innovative idea of trying to reverse the trends by planting corridors of native flowers across our countryside as a simple way of providing additional nectar sources for bees and providing links between populations of many other insect species. Even birds and bats would eventually benefit.

The editor, Norman Maclean, is to be congratulated for publishing an excellent book.

JOHN BADMIN

OBITUARY



CHARLES MACKECHNIE-JARVIS
1907–2009

It was with great sadness that I learnt of the death of Charles MacKechnie-Jarvis on 22 March 2009 following a short illness at Salisbury Hospital. He was 101 years of age.

Born in London on 29 August 1907 his start in life was from very humble origins. It appears that he was a shy, very precocious and bright child who from earliest memory was fascinated by natural history and science. Although he received only a basic education at the local Board School in Kennington, his thirst for learning was insatiable and this led to him seeking out knowledgeable adults who would befriend him, encourage him and share their knowledge with him. One such was the local chemist who would write him out instructions for chemical experiments. Leaving school at 14, he only got a job as a factory boy in the South London Electrical Apparatus Company as a result of his doggedly continuing to return and ask for employment having been told at first that there was no work for him. From an early age he had been especially infatuated with electricity and had set his sights upon becoming a chartered electrical engineer. He attended evening classes in pursuit of this goal and in the early 1930s duly became chartered and was moved by his company to Sheffield to be in charge of their heavy engineering operation in the field of coal mining. Just prior to the outbreak of the Second World War he moved to Bedford to join Allen's Engineering Company where he remained throughout the war as a development and production engineer. After the war he acquired premises in London and set himself up as a consultant electrical and mechanical engineer. By dint of sheer hard work he built up a highly successful and profitable business. During this time he contributed sections on various aspects of electricity to the – at that time – only five volume, prestigious, standard work edited by Michael Singer *et al.* *"A History of Technology"* (1954–1958) and probably other similar publications as well. He continued to work until well into his 70s.

It was because of our shared interest in Coleoptera that I first came to meet Charles in May 1974 when he was 67. He had recently moved from London to a property in the Close of Salisbury Cathedral and I had been alerted to this from a change of address notice which he had published in the *The Entomologist's Monthly Magazine* – at that time the journal of choice for the publication of notes and papers on the British Coleoptera. In 1969, I had begun visiting Wiltshire two or three times each year to collect beetles in that under-recorded county so I contacted Charles to ask if we could meet to "talk beetles". He responded with great enthusiasm to my suggestion and invited me to come for afternoon tea and stay over for supper. This was to be the first of many such evenings over the course of the next 18 years whenever I came down to Salisbury, at first at the Close and then at the Granary at Milford to which he moved in 1984. Charles and his wife Brenda were always the perfect host and hostess, welcoming me with warmth and enthusiasm and making me feel totally relaxed and comfortable – I almost wrote "at home" instead of comfortable but although that would have applied to the way I had been made to feel, the ancient house in the Close with its later Georgian exterior was a very special and unique home. That first meeting set a pattern at the Close which I came to look forward to each time I visited. Following afternoon tea with Brenda, Charles and I would go up the very wide central staircase to his magnificent, spacious, book-lined study which was the largest room in the house. There we discussed and looked at beetles and referred to the standard works in his comprehensive library, only to be interrupted by Brenda bringing us a fine sherry a short while before we went down for supper. After the meal, Charles and I would retire to the study once again, remaining there until I took my leave around 11 p.m.

Charles had first been stimulated to take an interest in entomology around the age of 8 by a Major Hart whom he used to meet whilst visiting relatives at Woodbridge in Suffolk during his school holidays. By his late teens he was taking a serious interest in collecting and studying beetles in such spare time as he had outside work and his evening classes. He joined the South London Entomological and Natural History Society in 1925, was a member of Council in 1929, and remained a loyal member throughout his lifetime. Here he was greatly encouraged and helped by two keen coleopterists, Sidney R. Ashby and Benjamin S. Williams and, as both were to become forever associated with Charles' name, it would seem important to say a word or two about them to place this connection on record.

Ashby was an enthusiastic amateur collector and Curator of the Society from 1920–1944. He never published anything and was, at heart, a field naturalist. Ashby loved accumulating beetles, both British and foreign and, as curator, had access to those specimens which were surplus to the Society's requirements. As well as his own personally collected material, his extensive collection contained large numbers of British duplicates many from his mentor the former curator William West of Greenwich (1836–1920; not W. West LDS who was a contemporary) as well as foreign beetles which he had been able to acquire because they were surplus to the Society's requirements. Ashby appears to have been obsessive in the preparation of his specimens and the appearance of his collection and so was an ideal curator. Charles first met him among the Society's cabinets in 1924 and he would have avidly assimilated this elderly man's knowledge, techniques and views on collections. Ashby, it appears, de-greased all or many of his specimens, re-mounting them on new cards after doing so – an extremely, time-consuming procedure. Charles was equally concerned with the appearance of his collection and using the thickest, highest quality Bristol board for his mounts and setting and dissecting specimens immaculately. He pinned selected-mounted specimens for de-greasing on what

looked to me like a lepidopterist's setting board with cork on both sides, propping this up in a very large, ca. 30cm tall gas jar filled with benzene.

Williams was an energetic, professional entomologist who was especially interested in the Staphylinidae. Based in Harpenden, he took Charles collecting with him to localities around the area. Originally a lepidopterist, he had taken up Coleoptera after serving in the Great War becoming very close friends with the highly-esteemed coleopterist Philip Harwood with whom he frequently collected, especially in the Highlands and the New Forest. Like Ashby, Harwood was essentially a field worker and although he only published a handful of notes, he was one of the most prolific of collectors, setting and distributing enormous numbers of duplicates some of which were passed on to Williams. Charles' move to Sheffield by his company following his chartership put an end to both these relationships for the next few years.

Just before the outbreak of the Second World War, Charles left Sheffield and moved to a new position in Bedford. He collected from localities within cycling distance of his home and began publishing notes on interesting captures and beetles new to the county list. He also wrote to B. S. Williams to try to re-establish contact. Sadly, Williams was too ill to see him; he died in February 1941 at the early age of 49. When informed of Williams' death by his widow, Charles kindly offered to help sort out his entomological effects including his collection and books – an offer which she and her only child Brenda were only too glad to take up. Whilst involved in this undertaking, Charles asked Mrs Williams for permission to take her daughter Brenda to a prom at the Royal Albert Hall; Charles and Brenda went on to marry in 1945. This fortuitous encounter arising from Charles' passion for beetles was to be the start of a close and loving relationship which was to endure for almost 65 years.

Between 1947 and 1959, work and family life left Charles little spare time for beetling. Localities visited for family holidays, however, were chosen for their beetling potential with trips to places such as Boscastle,Windermere, the Wye Valley and South Repps (Norfolk). On these, Charles' sons were enlisted to participate in his search for beetles having been taught from an early age the means whereby a staphylinid could be distinguished from a curculionid! It was not until he moved in 1960 to Sloane Gardens SW1 near to his office that he had the time to take up the serious entomology of his bachelorhood again. Here he entertained the staphylinid specialist Alex Williams on numerous occasions to the mutual benefit of both as they helped each other with the identification of genera such as *Philonthus* and *Bembidion*. He also began visiting Brownsea Island at this time and continued to do so well into the 1970s.

In 1931, the coleopterist K. G. Blair based at The Natural History Museum had published an important paper summarising knowledge about the Coleoptera of the Scilly Islands (*Proc. Zool. Soc. London* **1931**: 1211–1258). It is possible that this stimulated Charles' initial interest, not only in that specific location, but also island faunas in general; he made a short visit to the islands that same year. Apart from their physical attractiveness, the Scillies would have appealed to him firstly, because their checklist showed only some 574 species – he knew there were additions to be made – and secondly, because it held the promise that there might be beetles new to the British list given the islands' limited accessibility to coleopterists as well as their geographical position. In May 1965 he made his first trip to the Isles of Scilly and he went on to make about sixteen more visits over the next decade. It became his personal, special project and was very important to him. Strangely, he appears not to have encountered the late Eric Gowing-Scopes – whom he knew – on his visits, despite Gowing-Scopes also collecting there annually between 1965 and 1980. Charles collected assiduously on his trips, accumulating an enormous number of

specimens. Each visit would generate so much material that dealing with its mounting and identification would usually occupy him until it was time for his next trip the following year. Adding and writing-up a species new to the British list is something to which most serious amateurs aspire. Charles achieved this goal when he found the staphylinid *Lathrobium rufonitidum* (formerly *L. fennicum*) during his Scillonian project.

In 1944, he had published in these Transactions (*Proc. S. Lond. ent. nat. Hist. Soc. 1943–1944*: 61–68 and portrait) a meticulously researched account of the life of the naturalist Sir Joseph Banks, who was instrumental in facilitating the foundation of the Linnean Society of London in 1788. I think that Charles probably chose Banks because he identified with him, seeing him as someone who had led the kind of life which he wanted for himself. However, I believe that it is his second contribution to these Transactions some twenty years later which ought to be seen as his most enduring written legacy.

Charles was invited to become President of the British Entomological and Natural History Society (the former South London) in 1974 and at the end of his term he chose as the subject of his Presidential Address "*The History of the British Coleoptera*". This substantial work of some 21 pages (plus 4 plates containing 16 portraits) has all the style and erudition of the Banks paper but this time is focused on a beloved subject rather than just on one admired individual's life and achievements. Charles saw himself very much as part of a continuum, as a member of a long line of entomologists whose lineage based on their interests could be traced back to Linnaeus and whose legacy was his inheritance. Although it is 'only' a presidential address this designation does not do justice to its importance. I feel sure Charles would not have minded me saying that he could not have written this paper at the time of the Banks' paper 30 years earlier. It represents the distillation of some fifty years learning about, and involvement with, the British Coleoptera. Charles was a prolific hoarder not only of anything relating to his own life (he even preserved his first pay slip showing his first earnings in 1921) but also in terms of sheets or scraps of paper on which he wrote down information relating to his main interests or anything which he considered might be of use at some later stage. His "*History*" is thus not a one-off, written because it was a requisite for a President; it represents a coming together of a lifetime's study of the subject. Of course, he never used a computer and I can imagine him preparing his address seated at his huge desk in the centre of his study in the Close surrounded by sheaves of loose paper of all sizes, reprints and books. In my opinion, this work ought to be made available as a separate publication so that a wider, younger readership may benefit. My signed and personally dedicated off-print rekindles memories of Charles and is a much-cherished entomological possession.

By the time I came to know Charles in 1974, his life as an active coleopterist was very much in decline because the deterioration of his eyesight was making microscope work increasingly difficult for him. Despite this, he had recently been on a collecting trip with Professor John Owen to the Shetland Isles and would go on during this same decade to lead a Society field meeting in Savernake Forest (1976, *Proc. Brit. Ent Nat. Hist. Soc.* **9**: 122), make a trip over to Lundy from the mainland where he was holidaying to find, successfully, the chrysomelid *Psylliodes luridipennis* which feeds only on the Lundy Cabbage (both beetle and plant being endemic to the island), and collect in Grovely Wood near Salisbury with an old beetling friend from his Bedford days, the Rev. E. J. Pearce. Additionally, on one of his trips over to Brownsea Island at this time he was delighted to find only the second known British example of the very rare eucnemid *Hylis cariniceps* previously only recorded from the

New Forest in 1966. He and Brenda also visited Walter Liebmann in Stuttgart at this time. Liebmann, a Jewish entrepreneur, had suffered greatly under the Nazis and his main collection of beetles was confiscated by them. In 1955, he had had printed in Arnstadt where he lived at that time,"*Käferfunde aus Mitteleuropas einschliesslich der österreichischen Alpen*" which was an excellent, catalogue of his captures with their field data. This appears to have been published privately as a limited, numbered edition – or so it would appear from my copy which has a few neat additions written in Liebmann's characteristic hand. Charles had exchanged many beetles with Liebmann in the past and some of those sent to him which were captured pre-1955 can be found referred to in this rare book.

When I first met him in 1974, Charles was working on the integration of his own collection with that of Ashby's, whose collection he had acquired upon the latter's death in 1944. Charles' obituary for him in these Transactions is essential reading for anyone working on his collection or who wishes to know where other Ashby and West insects could at that time be located. Charles was a good, all-round coleopterist whereas Ashby had tended to concentrate on the larger or more easily identified groups. Charles' specimens of the more difficult and less-studied families were, therefore, very important in improving the comprehensiveness and value of the combined collection. He was also naming and incorporating material from the storebox collection of the staphylinid specialist William O. Steel (1917–1969) which he had acquired after the Natural History Museum had taken Steel's important collection of Omaliinae upon which he was an acknowledged authority. Much of this was rough mounted – the result of intensive surveys of places such as Freshfield and Rùm – without determination labels and with only coded locality numbers etc. on the back of the cards. Charles had spent much time at the Natural History Museum using Steel's notebooks to match the codes to the localities and dates which they represented. He was then re-mounting and identifying the most interesting and significant beetles and affixing full data labels.

In 1988, when the long job of amalgamation was eventually completed, Charles passed his collection and reprint library (ca. 1,888 items) on to Liverpool Museum. Housed in three beautiful, 40-drawer cabinets – one by Gurney and two by Brady – his collection comprises around 40,000 specimens representing around 95% of the British fauna. Two years later in 1990, the museum held a special meeting entitled "*An afternoon with Charles MacKechnie-Jarvis*" which was well-attended by coleopterists, mostly from the north west, who had the opportunity to meet Charles, look at his collection and discuss beetles. I know Charles enjoyed his day immensely. It had long been intended that his collection, itself containing many B. S. Williams specimens, would eventually go to Liverpool because Williams' collection of some 20,000 beetles had been bequeathed to them in 1941. To-day, their cabinets stand side by side with both retained as separate collections; I understand that they are regularly consulted by staff and visitors alike which would have pleased Charles immensely. At the end of the decade Charles offered me the rest of his duplicates, but as I was unable to drive at that time it was decided in 2001, to pass them to the Society. Following Charles' death, the remaining few storeboxes of beetles, his notebooks and entomological paperwork were passed to Liverpool Museum.

Charles MacKechnie-Jarvis was a remarkable and complex man. He was a polymath with an amazing memory and an encyclopaedic knowledge of a vast and varied range of subjects and, although beetles were his central passion, he was also an avid and knowledgeable collector of coins and Chinese ceramic pots as well as an expert on alpine plants and rock gardens. Full of confidence and self-conviction he did not suffer fools gladly. Although life was a learning experience for him he also

found time to enjoy it for he was also a *bon viveur*, revelling in dinner parties, good food and above all, good wine – this latter affirmed by even my inexperienced palate! He also loved the London institutions and was a member of the Horner's Livery Company and four masonic lodges, a Wandsman at St. Paul's and an elected Visitor of the Royal Institution, this last pleasing him mightily because of its connections with his heroes, the great scientific experimenters Michael Faraday and Robert Hooke. Upon moving to the Close, he became a very keen member of its preservation society and advised the Cathedral on its new lighting. Charles loved the ancient gentleness and charm of living in the Close with its magnificent Cathedral as a backdrop, and, as has been written recently of Faraday, a strong sense of the unity of God and nature pervaded all of Charles' life and work.

The importance of Brenda in Charles' life cannot be overstated. It was her love and constant support which enabled him to have the space to pursue his interests and love of life to the full. The years leading up to his passing were not easy as his hearing worsened and he became less mobile. Thanks to Brenda's care and sheer determination to keep going, however, he was able to stay in his own home and still enjoy his beloved garden until only a few days before the end.

Unfortunately, after 1992, circumstance prevented me from travelling down to see him although I remained in touch with him by phone or letters thereafter. The debt which I owe to Charles is considerable. Apart from his hospitality, greatly valued friendship, encouragement and the sharing of his knowledge, he passed on to me over the years the majority of his many storeboxes of duplicate beetles, both British and foreign including the European ones received from Liebmann. Many specimens from these are now incorporated into my own collection whilst the remainder have recently been passed to Colchester Museum which now houses the W. West collection. It should be mentioned that Charles was also instrumental in helping another well-known coleopterist, the late David Appleton, by generously giving him a cabinet and microscope when he was a beginner. It is a fitting tribute to his memory, therefore, that I can end by dedicating to Charles the same words and sentiments which he wrote of Ashby in his obituary for his mentor – *"The assistance and encouragement he bestowed upon the younger men cannot be over-estimated and their gratitude will keep his memory green."*

I tender my most sincere condolences to Brenda and her children Iain, Andrew, Marian and Jonathan as well as to her seven grandchildren and five great grandchildren; I am also grateful to Brenda and Iain for much of the historical information included here and to Jonathan for sending photographs.

David Ridley Nash

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FIELD MEETING REPORTS

Slab Common and The Warren, Bordon, Hampshire, 4 July 2009

Leader: Stephen Miles. – The site comprises heathland with deciduous scrub and coniferous woodland, with a small area of acid bog and associated wetland habitats. It is registered as a local Site of Interest to Nature Conservation (SINC). The meeting was organised as a joint meeting of the Alton Natural History Society (ANHS) and the British Entomological and Natural History Society (BENHS). The purpose of the visit was to obtain more species records and site information for the Local Biodiversity Action Plan. Fortunately it was a dry and sunny day, pleasant and not too hot.

Seven members of the ANHS attended, although some of these departed at lunchtime and four members of the BENHS including the leader turned up plus a member of the British Dragonfly Society. The leader had arranged a day or two before to go around the site with the county botanical recorder for North Hampshire, Mr Tony Mundel: this was so that the positions of the botanical specialities could be noted and then shown to the ANHS visitors on the day.

In sequence from the western part of the site at Southlands, where the cars were parked and working eastwards to the area north of Blackmoor Golf Course the wildlife seen in the wet and dry heathland was as follows:

Greater spotted woodpecker, stock dove and swallow were seen near Pond Cottages as well as meadow brown and ringlet butterflies. Skirting the southern edge of The Warren near the northern part of Blackmoor Golf Course a specimen of the uncommon hare's-tail cotton grass, *Eriophorum vaginatum* was observed in some wet heathland where it has been known for many years. Walking north towards more wet heathland on the central bog, a green woodpecker was seen followed by three turtle doves perched and calling from the electricity wires that traverse the site. The latter was a good record as this summer visitor is now generally uncommon. Yellowhammers were also seen on these wires.

Meanwhile Andrew Halstead was busily sweeping the herbage in the bog on The Warren south of the small stream and turned up the following moths: Brown silver-lines, a Dingy footman, a dead Clouded border and the larva of the Small chocolate-tip, a local and notable (Nb) species that feeds on dwarf willow. The hoverfly *Sericomyia lappona* (L.) was swept in the bog and another was seen, in this its typical habitat.

Greater bird's-foot trefoil, *Lotus pedunculatus* and marsh speedwell, *Veronica scutellata* were noted in the long grass at the edge of the wetter areas. Heath rush *Juncus squarrosus* and common dodder *Cuscuta epithymum* growing on Dwarf gorse, as well as common and oblong-leaved sundews, *Drosera rotundifolia* and *D. intermedia,* respectively, were also pointed out, growing so close to each other on bare wet sand that comparison between them made identification easy. Here also was white-beaked sedge, *Rhynchospora alba*. At the start of the bog a nice selection of bog asphodel *Narthecium ossifragum,* marsh clubmoss *Lycopodium inundatum* and on the bog hillocks, cranberry *Vaccinium oxycoccus* was visible. Further north in the wettest sections, June Chatfield identified white sedge *Carex curta* and bottle sedge *Carex rostrata* and Flat-topped bog-moss *Sphagnum fallax* amongst the many *Sphagnum* species present. Large raft spiders both in and out of their lairs were admired by all and both Small copper and Large skipper butterflies were also seen. Nick Hughes spotted a nightjar at rest on a cut pine tree log pile, hidden away in the

bog vegetation, the whole group were pleased with the photographs they were able to take of this serene bird. During the morning, common lizard and a slow-worm were seen and in this bog two days before an adder had also been present.

In a sequel to the morning's observations just before we left the heath near the golf course, Penny Raynor thought she heard the calls of a grasshopper warbler, but she admitted it could just have been a grasshopper. This scarce bird occurred here from 1971 to 1985 according to the Hampshire Ornithological Society records so the possibility of its continued occurrence remains a distinct possibility.

In the afternoon east of Pond Cottages on a sandy track, the solitary wasps, *Cerceris arenaria* (L.) and *C. rybyensis* (L.) were observed visiting their nests. Further east on Slab Common, comma, meadow brown and marbled white butterflies were seen. On the wetter sandy paths near the stepping stones passing through the stream at the centre of the site, two male Keeled skimmers *Orthetrum coerulescens* (Fabr.) were observed on a sand bar by David Pepper. On the slightly drier paths later on June Chatfield pointed out marsh cudweed *Gnaphalium uliginosum* and corn spurrey *Spergula arvensis*, plants of interest because of their liking for disturbed sandy areas. Wren, whitethroat, blackcap, willow warbler, chiff-chaff, song thrush, nuthatch, greenfinch and bullfinch were also noted.

Andrew Halstead provided a long list of insects, the most interesting being the tabanid fly *Chrysops viduatus* (Fabr.), a mire species more frequently recorded on the New Forest and Dorset Heaths, and the solitary wasps, *Crabro scutellatus* (Scheven) and *Stigmus solskyi* Morawitz. The first of these is a nationally notable species (Na) which has been recorded on this site by the leader since 1989, where it preys on small flies of the family Dolichopodidae. The second species, an aerial nester, is new to the site and preys on aphids.

The leader wishes to thank the Chairman of the Longmoor Conservation Group, representing Defence Estates for permission to hold this meeting.

Linchborough Wood, Conford, Hampshire, 15 August 2009

Leader: **Stephen Miles.** – Permission was obtained from the site owners, the Ministry of Defence, to use generators and moth light traps. The first pair of traps was placed near to a large grassy clearing outside the military range danger area, with John Phillip's mv trap set out in the open space and David Hamilton's actinic trap situated along a small footpath surrounded by deciduous trees. The second trap site was in the grounds of the now demolished Linchborough Lodge, within a small area of grassland containing old plants and shrubs that formed part of the garden of this house, grading westwards in the enclosure to bracken and scrubland. It was surrounded by high oak forest and coppice hazel woodland to the east, north and west grading to coniferous plantations and the open heathlands of Woolmer Forest to the south. Here Stephen Miles' actinic trap was placed in one corner with large oak trees in the vicinity and Pete Twine's mv trap was placed in the middle of the open vegetation near to areas of bracken and old fruit trees. These locations were within the perimeter of the range danger area but of course no military training was scheduled for this night.

All of these sites were within the Woolmer Forest part of the Wealden Heath's II Special Protection Area and the Woolmer Forest European Special Area of Conservation. Accordingly a special notice of consent was obtained from Natural England for permission to trap moths on this SSSI and as part of the fulfilment of the conditions a full species' list has already been supplied to Natural England.

The meeting was organised as a joint meeting of the Alton Natural History Society (ANHS) and the British Entomological and Natural History Society (BENHS). The purpose was for moth recording and general natural history observation. Fortunately it was a dry evening for the seven people including the leader who attended the meeting. Three of those present were also bird watchers and they recorded two pairs of Firecrests before it got dark in the area just south of the Linchborough Lodge grounds.

All of the traps were run for approximately three hours ending at midnight. More moths were observed coming to the traps situated within the grounds of Linchborough Lodge. Sixty-five moth species were recorded in total. At least 26 examples of male Black Arches, *Lymantria monacha* (L.) were recorded; a number perhaps to be expected in an area surrounded by large oak trees, indeed this species was present in every trap. The only other species recorded in double numbers was the Large Yellow Underwing, *Noctua pronuba* (L.). Only one notable species was taken and this was the Satin Lutestring, *Tetheella fluctuosa* (Hübn.), a larval feeder on birch. This species was a predictable one to be observed here as this area is described as the species' headquarters in Hampshire.

Fifty-three moth species were new to this tetrad based on the published records up to 2001 included in the *Moths of Hampshire and the Isle of Wight* by B. Goater and T. Norriss. No BAP or RDB species were found. The more local of the species in the traps in terms of their current tetrad occurrence in north and east Hampshire (for reference see the distribution maps at *www.hantsmoths.org.uk*) were: two Dingy Shell, *Euthoeca nebulata* (Scopoli), taken at David Hamilton's trap, with post-2000 records from 18 tetrads; Oak Nycteoline, *Nycteola revayana* (Scopoli), caught in both David Hamilton and Pete Twine's traps, with post-2000 records from 24 tetrads; Satin Lutestring *T. fluctuosa,* with post-2000 records from 12 tetrads; Svensson's Copper Underwing, *Amphipyra berbera* Rungs, with post-2000 records from 16 tetrads; Dotted Clay, *Xestia baja* (D. & S.), with post-2000 records also from 16 tetrads. All three of these latter species were taken in Pete Twine's trap.

For the consent to trap moths at this site, special thanks go to the staff of Natural England at their Reading office and for permission to hold this meeting thanks go to the Chairman of the Longmoor Conservation Group, representing Defence Estates.

Folkestone Warren, Kent, 30 August 2009

Leader: **Eric Philp**. – Some nine members turned up on a cold, dull day and with a brisk wind, the weather being nothing like one would have hoped for in mid-summer. With practically no insects on the wing the only butterflies recorded were *Colias croceus* (Geoffroy) (Clouded Yellow) and *Lysandra bellargus* (Rottemburg) (Adonis Blue). The main purpose of the meeting was to see if the weevil *Hypera pastinacae* (Rossi) was still present in its only present known British locality. However, there are changes taking place in the vegetation of the area and *Buddleja davidii* (Butterfly-bush) has spread over vast areas of the Warren although the management is making a rigorous effort to control this plant. Also, on some of the steeper parts of the cliffs coarse grasses are becoming more dominant and many of the special chalk plants are becoming less, frequent, including the food plant of *H. pastinacae* which is *Daucus carota* ssp. *gummifer* (Sea Carrot). Searches were in vain save right at the end of the meeting when Roger Booth found one specimen on a difficult to reach plant of Sea Carrot. The same recorder also found several specimens of the flea beetle *Longitarsus aeruginosus* (Foudras) on *Eupatorium cannabinum* (Hemp-agrimony) which was new to Kent and possible the first British record for some 85 years. Roger also found the

ptiliid *Acrotrichis henrici* (A. Matthews) which also appears to be a new county record.

Andrew Halstead found leaf mines of the elusive agromyzid fly *Chromatomyia scolopendri* (Robineau-Desvoidy) on *Asplenium scolopendrium* (Hart's-tongue) and also recorded two recent colonizers *Harmonia axyridis* (Pallas) (Harlequin Ladybird) and *Colletes hederae* Schmidt & Westrich (Ivy Colletes). Kevin Chuter searched *Beta vulgaris* ssp. *maritima* (Sea Beet) and found the weevil *Lixus scabricollis* Boheman which was new to the south coast of the county. He also recorded the squash bug *Enoplops scapha* (Fabr.) which is one of the specialities of that stretch of the coast, and he was one of several recorders who found *Corizus hyoscyami* (L.) (Firebug) which now appears well established in the Warren.

Holt Heath, Dorset, 8 May 2010

Leaders: **Raymond Cook and Andrew Page**. – Unseasonable very cool weather with a northerly airflow was disappointing for early May and meant that the field meeting planned to survey the site for adults of the Dingy Mocha, *Cyclophora pendularia* (Clerck) (RDB species & UK BAP priority) was nearly abandoned. Members from the Midlands and the Suffolk Moth Group who had planned to attend cancelled their visit as the conditions were so poor. Only one local member joined the leaders, four mv light-traps were run and 18 species were recorded, the best being two *C. pendularia* (Dingy Mocha), one *Odontosia carmelita* (Esper) (Scarce Prominent), *Cyclophora albipunctata* (Hufnagel) (Birch Mocha) and *Ectropis bistortata* (Goeze) (Engrailed), so in spite of the weather at least we saw the target species.

National Moth Night, Saltram House, Devon, 15 May 2010

Leaders: **Roy McCormick** and **Richard Fox**. – Sadly, as often seems the case, the weather was not kind for this year's National Moth Night. May was a very unsettled month and temperatures quickly dipped as a small group of Devon Moth Group members set up traps in the gardens close to Saltram House. The National Trust warden, Stephen Holley, had done an excellent job of promoting the event and come 20.00h, over 50 members of the public, including many children, had assembled at the meeting point.

We did our best to enthuse and entertain them. Some moths that had been caught previously by the leaders were handed round and many questions about moths and moth recording were answered. As the theme of this year's National Moth Night was Moths and Bats, Stephen then led a bat walk around the property. Devon Bat Group had kindly loaned a boxful of bat detectors, so everyone was able to have a go. Lesser Horseshoe bats and Common Pipestrelles were seen, and heard on the detectors.

Moth trapping was hard going in the cold night-time conditions and people began to drift away. Nevertheless, we turned up quite a few attractive moths for the hardy participants who stayed on, including Waved Umber *Menophra abruptaria* (Thunberg); White-pinion Spotted *Lomographa bimaculata* (Fabr.); Great Prominent *Peridea anceps*; Lunar Marbled Brown *Drymonia ruficornis* (Hufn.); and, slightly surprisingly, Dark Sword-grass *Agrotis ipsilon* (Hufn.).

Although not a great night's mothing, this joint event with the National Trust was successful at reaching out to a much wider audience than usual. The event was even recorded and turned into a programme for hospital radio at Derriford, spreading the

word about moths to yet more people. We are very grateful to Stephen Holley and the National Trust for all their help and support for the event.

Warleigh Point, Plymouth, Devon, 19 June 2010

Leaders: **Roy McCormick** and **John Randall**. – The leaders arrived early so that we could check over the site to see where we could run our lights; John knew the site as he had visited it before, but light trapping would be new for this area. We settled on a cleared area where several traps could be placed, but before anything could be done, John set about clearing up rubbish that had been scattered around the area by people who had no regard for their environment. I started putting my traps out while John went back to the main gate to direct people where to come. We were eleven in all, with one member bringing his family; also present was Bob Heckford our resident microlepidoptera expert so we would have no problems identifying the micros.

I had only brought two traps and we had one other person, a member of the BENHS who had a tripod light over a sheet, so the expected rush of traps never materialised! The night was dry, but not very warm with temperatures around 14°C and a half phase moon. The moths started to come in fairly early even though dusking had proved a failure. The list built steadily with several Mottled Beauty *Alcis repandata* (L.) with a good variety of banded forms with one or two of these very striking varieties. We also observed several Brindled White-spot *Parectropis similaria* (Hufn.) which can be quite common in some areas. Other highlights of the night were one White-line Snout *Schrankia taenialis* (Hübn.), an uncommon moth but, because of its size, probably overlooked; three *Pandemis cinnamomeana* (Treitschke); a couple of very late Orange Footman *Eilema sororcula* (Hufn.); and one *Pseudatemelia josephinae* (Toll). Other interesting species seen were one *Ancylis diminutana* (Haworth); one Brussels Lace *Cleorodes lichenaria* (Hufn.); one Lobster Moth *Stauropus fagi* (L.), a female (unusual to see at light); and one Alder Moth *Acronicta alni* (L.). As the main leader did not wish to stay too long, we started packing up at around 00.30h and left the site around 01.00h, having had a reasonable night with 57 species recorded, with some of these in good numbers.

Bystock DWT Reserve, Devon, 17 July 2010

Leader: **John Randall**. – Devon Wildlife Trust's Bystock Reserve comprises a range of different habitats including dry and wet lowland heathland, broad-leaved woodland, conifer plantation, semi-improved neutral grassland, small pools and a man-made reservoir.

Nine Devon Moth Group members and ten very keen DWT members attended and ten light-traps were installed over a wide area. Paul Butter and Bob Heckford led the investigation of the traps and a total of 142 species was recorded. The pick of these were Leopard moth *Zeuzera pyrina* (L.); *Epinotia demarniana* (Fischer von Röslertamm); *Clavigesta sylvestrana* (Curtis); *Pempelia genistella* (Duponchel); Birch Mocha *Cyclophora albipunctata* (Hufn.); Plain Wave *Idaea straminata* (Bork.); Horse Chestnut *Pachycnemia hippocastenaria* (Hübn.); The Annulet *Charissa obscurata* (D. & S.) (dark heathland form); Kent Black Arches *Meganola albula* (D. & S.); and Striped Wainscot *Mythimna pudorina* (D. & S.).

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Cover photograph: The leafhopper *Macropsis megerlei* (Fieber), male, Morfa Harlech, 2 July 2010. Photo: Tristan Bantock.

NOTE: The Editor invites submission of photographs for reproduction on the front covers of the journal. The subject matter is open, with an emphasis on aesthetic value rather than scientific novelty. Submissions should be in the form of colour or black and white digital images (jpg or tiff format) with a minimum resolution of 1275 pixels (i.e. 4.25 inches @ 300dpi).

SPECIES OF ORIBATID MITE (ACARI: ORIBATIDA) NEW TO BRITAIN

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Abstract

Fifteen species of oribatid mite new to Britain are reported: *Brachychthonius hirtus* Moritz, *Camisia lapponica* (Trägårdh), *Camisia solhoeyi* Colloff, *Carabodes ornatus* Storkán, *Carabodes reticulatus* Berlese, *Ceratozetes minutissimus* Willmann, *Conchogneta dalecarlica* (Forsslund), *Liochthonius strenzkei* Forsslund, *Micreremus gracilior* Willmann, *Microzetes septentrionalis* (Kunst), *Mixochthonius pilososetosus* (Forsslund), *Oribatella litoralis* Strenzke, *Paratritia baloghi* Moritz, *Trimalaconothrus sculptus* Knülle and *Trimalaconothrus vietsi* (Willmann). The presence of *Amerobelba decedens* Berlese in Britain has been confirmed. Taxonomic and biogeography data accompany each species, where applicable. The need to republish the oribatid checklist for Britain is discussed.

Introduction

In the classic sense of the group, oribatid mites (also called beetle mites, armoured mites, or moss mites) comprise more than 9,000 named species (Schatz, 2002, 2005; Subías, 2004) representing 172 families. Although many are arboreal and a few are aquatic, most oribatid mites inhabit the soil-litter system. They are often the dominant arthropod group in highly organic soils of temperate forests, where 100–150 species may have collective densities exceeding $100{,}000m^{-2}$ (Norton & Behan-Pelletier, 2009).

From the British perspective, the only published monograph of the Oribatida was by Michael (1884, 1888). Later, Turk (1953) provided a synonymic list. Luxton (1996) produced the most up-to-date checklist. Luxton produced his own monograph which remains unpublished. It is pleasing to report many workers in their study of the Oribatida worldwide have benefitted from its contents due to Luxton's generosity.

The Revd J. E. Hull made important contributions to our knowledge being active between 1913 to 1930 (see Luxton, 1987 for his in-depth analysis of Hull's work). Halbert also produced a significant body of work at this time (Luxton, 1998).

Oribatid mites are found on every continent. None are pests, as such, but some species can act as intermediate hosts of sheep tapeworm. The group is not widely studied, probably due to their minute size (0.15 to 1.5mm in length), their secretive habit and their lack of economic importance. Oribatid mites eat fungi, algae and rotting plant matter and play their part in the decomposition process. Cuticle colour can be clear, through pale straw to brown, on to black in some adults.

Copulation is not known to occur in British species, males producing stalked spermatophores placed randomly on surrounding substrate awaiting passing females to take them into their genital opening.

Detailed discussion of external morphology of British oribatids is beyond the scope of this paper; sufficient to say the sixteen species illustrated, clearly demonstrate a wide variety of external morphology by just a small selection of British oribatids.

Two recent books recommended are Walter & Proctor (1999), an interesting, detailed and informative presentation on mites in general and Weigmann (2006), written to identify oribatid mites found in Germany and adjacent countries (in German).

This paper is the result of a continuing personal familiarisation with the British Acari.

Materials & Methods

Collection and extraction of specimens

Collections were obtained from a variety of habitats, by a number of collectors, in addition to those of the author. Habitats included a grass lawn, leaf litter, lichen, moss, rotting straw, rotten wood and soil (the latter obtained as cores) with sites distributed across England, Scotland and Wales.

The author's collections were sieved on site through a wire mesh with an aperture size of 6 mm and transported to National Museums Liverpool in plastic bags, as was a small amount of coarse detritus left in the sieve. As soil arthropods generally have an aversion to heat and light, the Berlese-Tullgren extractor was chosen to take advantage of this trait. This extractor was employed by the remainder of the collectors irrespective of sampling technique used.

Sievings/soil cores were placed directly onto a fine metal sieve with a 25W tungsten bulb suspended directly above as the heat/light source. The soil cores were placed, vegetation side down, allowing arthropods to vacate via natural gaps previously made by other arthropods and worms.

Arthropods were driven out of the samples, through the sieve, via the funnel below into a small vessel containing 70% alcohol. Before loading sieved material, a 1–2cm layer of coarse detritus was placed over the funnel mesh to reduce the amount of fine debris falling into the alcohol during the extraction process. Extraction began one day after samples were collected and lasted seven days.

Preparation of specimens for scanning electron microscopy

Specimens were removed from full strength lactic acid, washed in distilled water, then mounted on aluminium stubs using double-sided adhesive tape or pads and sputter-coated for examination under a scanning electron microscope. Images were recorded by image-capture software (for Fig. 5) or onto 35mm black and white film (for Fig. 13). Specification of sputtering equipment, sputter coatings and scanning electron microscopes used were not recorded.

Description and measurement of specimens

Observations and measurements were taken from specimens temporarily immersed in full strength lactic acid on glass cavity slides under a compound microscope.

Voucher specimens

These are deposited (in alcohol) with National Museums Liverpool (Entomology Department).

Species list

Amerobelba decedens **Berlese** (Fig. 1)

Family: Amerobelbidae Grandjean

Length: 750–850μm

Previous known distribution: Central and southern Europe, Canary Islands and Azores (Weigmann, 2006).

Previous known habitat: preferring clayey fields and disturbed soil in cities; in south facing forests in Hungary (Weigmann, 2006).

This is the only known member of the genus *Amerobelba* Berlese (Subías, 2004).

Record: **England** – Liverpool, Speke Hall (National Trust) (SJ419827), Merseyside; from the edge of the grass lawn north of the Hall, 18.ix.2002 (eight specimens) (F. D. Monson).

Luxton (1996) preceded the species name with a 'question mark' to reflect the manner recorded by Davis (1965). This new record confirms the presence of *A. decendens* in Britain.

***Brachychthonius hirtus* Moritz** (Fig. 2)

Family: Brachychthoniidae Thor

Length: 160–170μm

Previous known distribution: Europe (Weigmann, 2006).

Previous known habitat: litter (Weigmann, 2006).

Record: **Wales** – Plynlimon (SN819858), Ceredigion; from soil at a hill farm, 13.ix.2002 (three specimens) (Centre for Ecology and Hydrology).

The genus *Brachychthonius* Berlese was previously represented in Britain by two species: *B. berlesei* Willmann and *B. bimaculatus* Willmann (Luxton, 1996).

Brachychthonius hirtus can be distinguished from other British *Brachychthonius* by the prodorsal setae, and some on the anterior notogastral shield, being weakly ciliate. The cilia most visible are on setae c_2 and c_3, although sometimes these are difficult to see (based on key in Weigmann, 2006 and Balogh & Mahunka, 1983). Body length, to width ratio at 2.5 is the slimmest within the genus in Britain.

***Camisia lapponica* (Trägårdh)** (Fig. 3)

Family: Camisiidae Oudemans

Length: 1100μm

Previous known distribution: Holarctic (less common in the south) (Subías, 2004); Canada and Poland (Colloff, 1993).

Previous known habitat: Black Spruce litter with moss cover (Canada); moss and soil (Poland) (Colloff, 1993).

Record: **Scotland** – nr. Newbigging, in the vicinity of the A93 road (NO18), Aberdeenshire; from peat soil in dwarf shrub heath, 31.ix.1999 (one specimen) (Centre for Ecology and Hydrology).

***Camisia solhoeyi* Colloff** (Fig. 4)

Family: Camisiidae Oudemans

Length: 800μm

Previous known distribution: Western Europe, Japan and Canada (Subías, 2004); Norway, Sweden, Poland, Austria (Colloff, 1993).

Previous known habitat: leaf litter (Poland); lichens (Austria) (Colloff, 1993); a montane species (Weigmann, 2006).

Record: **Scotland** – nr. Newbigging, in the vicinity of the A93 road (NO18), Aberdeenshire; from peat soil in dwarf shrub heath, 31.ix.1999 (one specimen) (Centre for Ecology and Hydrology, Merlewood).

The genus *Camisia* von Heyden was previously represented in Britain by seven species: *C. biurus* (C. L. Koch), *C. biverrucata* (C. L. Koch), *C. horrida* (Hermann), *C. invenusta* (Michael), *C. segnis* (Hermann), *C. spinifer* (C. L. Koch) and *C. umbratilis* (Hull) (Luxton, 1996).

Camisia lapponica and *C. solhoeyi* can be distinguished from other British *Camasia* species by both being monodactylous; the remainder are tridactylous. *Camisia lapponica* possesses fourteen pairs of genital setae with broad, phylliform notogastral

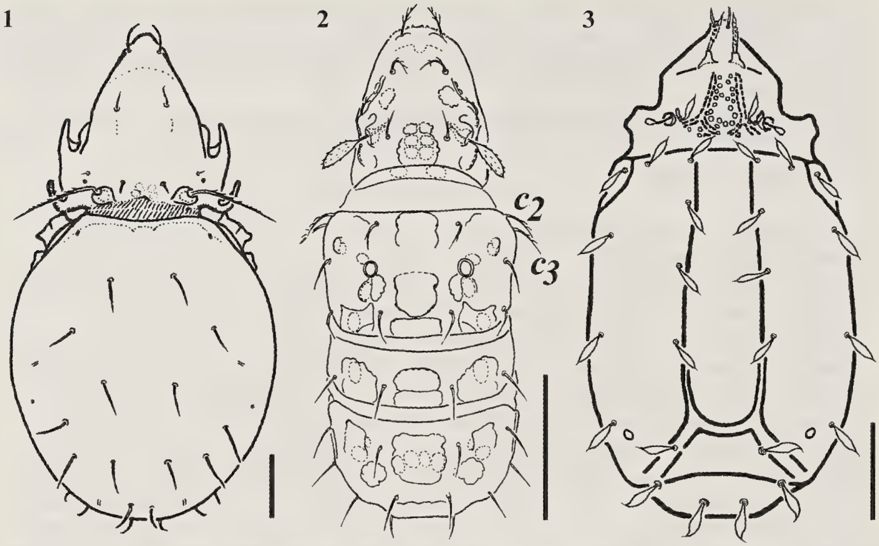

Fig. 1. *Amerobelba decendens* Berlese (after Weigmann & Schwalbe, 1994) modified to include both sensilli (scale bar = 100μm).
Fig. 2. *Brachychthonius hirtus* Moritz (after Moritz, 1976b) (scale bar = 50μm).
Fig. 3. *Camisia lapponica* (Trägårdh) (after Colloff, 1993, Trägårdh, 1910 and author's own observations of a single specimen in his collection) (scale bar = 100μm).

setae; *C. solhoeyi* possesses nine pairs of genital setae, with notogastral setae giving the impression of being of a slightly phylliform shape (based on remarks and key in Colloff, 1993).

***Carabodes ornatus* Storkán** (Fig. 5)
Family: Carabodidae C. L. Koch
Length: 760–820μm (Weigmann, 2006 gave length variation as 540–690μm).
Previous known distribution: Palaearctic (Weigmann, 2006).
Previous known habitat: in acid forest and peat soil (Weigmann, 2006).
Record: **Scotland** – nr. Braemar, Ballochbuie Forest, Balmoral Estate (NO199897), Aberdeenshire; from soil in pine forest, x.2004, numerous specimens (five specimens are retained in the author's collection; the length variation was derived from the latter five specimens) (G. Osler, Macaulay Land Use Research Institute, Aberdeen).

***Carabodes reticulatus* Berlese** (Fig. 6)
Family: Carabodidae C. L. Koch
Length: 700–800μm
Previous known distribution: Europe (Weigmann, 2006)
Previous known habitat: in forest soil, moss and a tree stump (Weigmann, 2006).
Collection sites: **Wales** – Bala, adjacent to lakeside (SH908326), Gwynedd; from moss on embankment supported by a dry stone wall, 16.iv.1994 (one specimen) (F. D. Monson); nr. Beddgelert (SH595483), Gwynedd; moss on hillside, 9.vii.1998 (one specimen) (F. D. Monson); **Scotland** – Faskally, near Pitlochry (NN900580), Perthshire; from lichen on a conifer trunk in mixed woodland, 19.ix.1985 (one specimen) (M. Luxton) (Bottle No. 94, Luxton Archive, National Museums Liverpool).

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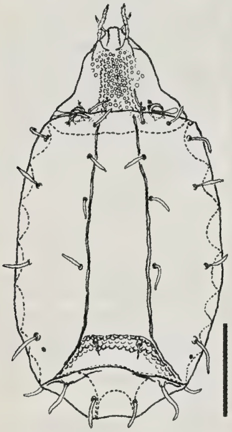

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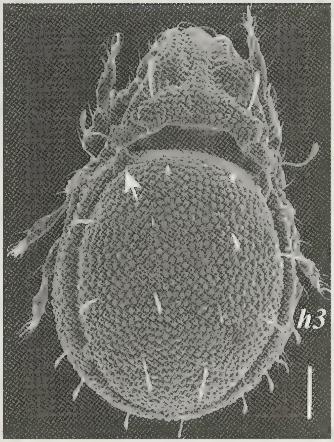

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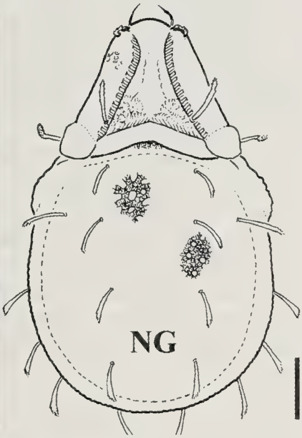

Fig. 4. *Camisia solhoeyi* Colloff (after Colloff, 1993) (scale bar = 100μm).
Fig. 5. *Carabodes ornatus* Storkán (SEM, Macaulay Institute, Aberdeen) arrow points to 'ear-like' structure; left seta *h3* missing (scale bar = 100μm).
Fig. 6. *Carabodes reticulatus* Berlese (after Weigmann, 2006) NG = notogaster (scale bar = 100μm).

The genus *Carabodes* C. L. Koch was previously represented in Britain by nine species: *C. affinis* Berlese, *C. coriaceus* C. L. Koch, *C. femoralis* (Nicolet), *C. labyrinthicus* (Michael), *C. marginatus* (Michael), *C. minusculus* Berlese, *C. rugosior* Berlese, *C. scaber* Monson and *C. willmanni* Bernini (Monson, 2009).

Carabodes ornatus and *C. reticulatus* can be distinguished from other British *Carabodes* species by differences in their dorsal sculpture. This is tuberculate in *C. ornatus* with a distal pair of 'ear-like' structures appearing to overlap with the anterior edge of the prodorsum. In *C. reticulatus*, reticulations over the central area, consist of an irregular mesh containing shallow pits. These are larger in the middle, smaller towards the sides, and replaced laterally by a microtuberculate surface (based on key in Weigmann, 2006).

***Ceratozetes minutissimus* Willmann** (Fig. 7)
Family: Ceratozetidae Jacot
Length: 330–360μm
Previous known distribution: Eastern Europe (Weigmann, 2006).
Previous known habitat: unclear (Weigmann, 2006)
Record: **England** – Liverpool, Speke Hall (National Trust) (SJ419827), Merseyside; from the edge of the grass lawn north of the Hall, 18.ix.2002 (25 specimens) (F. D. Monson).

The genus *Ceratozetes* Berlese was previously represented in Britain by four species: *C. gracilis* (Michael), *C. mediocris* Berlese, *C. peritus* Grandjean (Luxton, 1996) and *C. parvulus* Sellnick (Monson, 1997). *Ceratozetes minutissimus* can be distinguished from the other four British *Ceratozetes* species by it having sensilli with dense, 'brush-like' hairs (based on key in Weigmann, 2006).

***Conchogneta dalecarlica* (Forsslund)** (Fig. 8)
Family: Autognetidae Grandjean

Length: 320–350μm

Previous known distribution: Palaearctic (Weigmann, 2006).

Previous known habitat: mainly in forest soil (Weigmann, 2006).

Record: **England** – Kents Bank, Grange-over-Sands (SD395757), Cumbria; from moss growing on soil and stones in deciduous woodland on the hillside behind the Abbot's Hall Hotel, 7.vi.2006 (three specimens) (F. D. Monson).

***Liochthonius strenzkei* Forsslund** (Fig. 9)

Family: Brachychthoniidae Thor

Length: 180–200μm

Previous known distribution: Palaearctic (Weigmann, 2006).

Previous known habitat: grassland soil (Weigmann, 2006).

Records: **England** – Liverpool, Speke Hall (National Trust) (SJ422828), Merseyside; from moss and leaf litter from the floor of Stockton's Wood, 8.vii.2008 (seven specimens) (F. D. Monson); Eaves Wood SSSI (SD471759), North Lancashire; a woodland on limestone pavement; from leaf litter in an area of hazel, sycamore and pine, on a south facing slope, 29.vii.2008 (one specimen) (H. Bedford).

The genus *Liochthonius* van der Hammen was previously represented in Britain by nine species: *L. brevis* (Michael), *L. evansi* (Forsslund), *L. horridus* (Sellnick), *L. lapponicus* (Trägårdh), *L. leptaleus* Moritz, *L. muscorum* Forsslund, *L. neglectus* Moritz, *L. sellnicki* (Thor), *L. simplex* (Forsslund) (Luxton, 1996). *Liochthonius perfusorius* Moritz and *L. hystricinus* (Forsslund) were later added to the British List by Monson (1998) and Arroyo & Bolger (2007), respectively. *Liochthionus alpestris* has been recorded for Ireland by O'Connell (1994) (T. Bolger, *pers. comm.*).

Liochthionus strenzkei can be distinguished from other British *Liochthonius* by the presence of two pairs of tubercles emitting setae f_1 and h_1 on the pygidium (Py)

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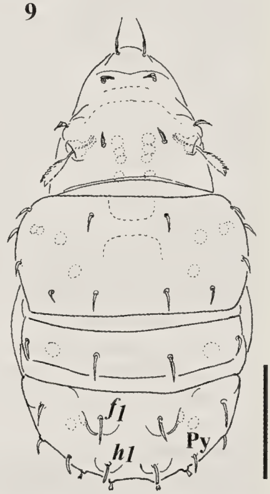

Fig. 7. *Ceratozetes minutissimus* Willmann (after Weigmann, 2006) ss = sensillus (scale bar = 100μm).

Fig. 8. *Conchogneta dalecarlica* (Forsslund) (after Forsslund, 1947) ss = sensillus (scale bar = 100μm).

Fig. 9. *Liochthonius strenzkei* Forsslund (after Moritz, 1976a) Py = pygidium; setae f_1 and h_1 set on associated tubercles (scale bar = 50μm).

(based on key in Weigmann, 2006).

***Micreremus gracilior* Willmann** (Fig. 10)
Family: Micreremidae Grandjean
Length: 290–300μm
Previous known distribution: Palaearctic (Weigmann, 2006).
Previous known habitat: in acidic peat soil and forest litter (Weigmann, 2006).
Record: **England** – Middle Low Wood, Witherslack (SD431865), Cumbria; from moss on woodland floor, 1.vii.2001 (two specimens) (F. D. Monson).

The genus *Micreremus* Berlese was previously represented in Britain by one species: *M. brevipes* (Michael) (Luxton, 1996).

Both species of the genus *Micreremus* can be distinguished by the respective shapes of their notogasters which, when seen from above, are oval in *M. gracilior*, but broader posteriorly than anteriorly in *M. brevipes* [note: Subías (2004) has synonymised *M. gracilior* with *M. brevipes*; the key in Weigmann (2006) clearly discriminates between the two species].

***Microzetes septentrionalis* (Kunst)** (Fig. 11)
Family: Microzetidae Grandjean
Length: 250–280μm
Previous known distribution: East Germany, Czech Republic, Austria and Hungary (Weigmann, 2006).
Previous known habitat: in humus of meadow steppes and rocky heaths, under trees (Weigmann, 2006).

Record: **England** – Markland's Farm, Tarbock Green, (SJ466876), South Lancashire; from rotting straw, situated just within the shelter of a Dutch barn with open aspect, 30.i.2006 (nine specimens) (F. D. Monson). [note: *Nellacarus petrocoriensis* Grandjean [= *Microzetes petrocoriensis* (Grandjean)] (Weigmann, 2006), the single microzetid species collected from Slapton Wood, Devon (Monson, 1998) was erroneously identified by Monson as *Nellacarus petrocoriensis* Grandjean. This has now been re-identified as *M. septentrionalis* Grandjean – the error was highlighted after consulting Kunst (1963), a paper listed by Weigmann (2006)].

***Mixochthonius pilososetosus* (Forsslund)** (Fig. 12)
Family: Brachychthoniidae Thor
Length: 200m
Previous known distribution: Holarctic (Weigmann, 2006).
Previous known habitat: forest floor, wet bogs, in moss and tree stumps (Weigmann, 2006).

Records: **England** – Burn's Beck Moss Nature Reserve (SSSI) (SD594878), Cumbria; from *Juncus* flushes, 10.v.2001 (one specimen) (National Museums Liverpool); Delamere Forest, (SJ535718), Cheshire; from a mixture of moss, leaf litter and rotting wood, on an embankment under pine trees, 10.xii.2007 (one specimen) (F. D. Monson).

***Oribatella litoralis* Strenzke** (Fig. 13)
Family: Oribatellidae Jacot
Length: 450–480μm
Previous known distribution: Europe (Weigmann, 2006).
Previous known habitat: drier area in marine coastal saltmarsh (Weigmann, 2006).

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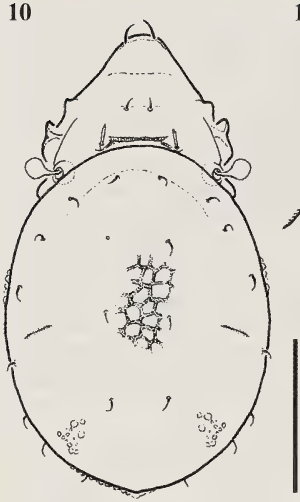

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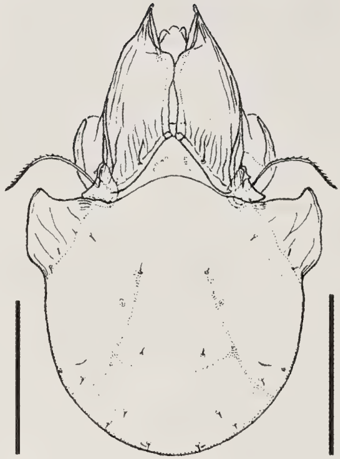

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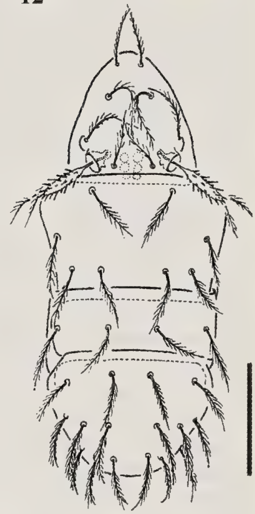

Fig. 10. *Micreremus gracilior* Willmann (after Weigmann, 2006) (scale bar = 100µm).
Fig. 11. *Microzetes septentrionalis* (Kunst) (after Kunst, 1963) (scale bar = 100µm).
Fig. 12. *Mixochthonius pilososetosus* (Forsslund) (after Moritz, 1976b) (scale bar = 50µm).

Records: **England** – Marshside, Southport (SD351205), Lancashire; from rotting salt marsh vegetation, just south of a now defunct sand treatment plant, 1.ii.2006 (25 specimens) (F. D. Monson); Kents Bank, Grange-over-Sands (SD397756), Cumbria; in front of and below Kents Bank Railway Station, from rotting salt marsh vegetation amongst rocks on salt marsh edge, 7.v.2006 (two specimens) (F. D. Monson); **Wales** – for location and collection data, see Monson (2000).

Monson (2000) provided a line diagram of the dorsal surface and a scanning electron micrograph (SEM) of the rostrum, viewed anteriorly. The original specimens were identified to genus level only, as the species name was unknown to the author at the time of publication. Weigmann (2006) led the author to its true identity.

The genus *Oribatella* Banks was previously represented in the British Isles by three species namely, *O. berlesei* (Michael), *O. calcarata* (C. L. Koch) and *O. quadricornuta* (Michael) (Luxton, 1996). *Oribatella superbula* (Berlese) was later added to the British fauna by Luxton (2000). *Oribatella litoralis* differs from other British *Oribatella* species in Britain possessing the shortest notogastral setae, about 20µm long – all others possess dorsal setae with lengths in excess of 50µm (based on author's observations and key in Weigmann, 2006).

The subspecies *Oribatella arctica litoralis* Strenzke 1950, was raised to species level in Weigmann (2006) but he omitted to discuss this decision in his text (Weigmann, *pers. comm.*).

Paratritia baloghi **Moritz** (Fig. 14)
Family: Oribotritiidae Grandjean
Length: 330µm

Previous known distribution: Europe (Weigmann, 2006).

Previous known habitat: dry soil in lawns (Weigmann, 2006).

This is the only known member of the genus *Paratritia* (Subías, 2004).

Record: **England** – nr. Totland, Isle of Wight (SZ38); in a rendzina soil core from a broad-leaved and yew woodland, 19.vii.1998 (one specimen) (Centre for Ecology and Hydrology, Countryside Survey 2000) (the Ordnance Survey locator is situated at the bottom left hand corner of the 10km square in which the species was found).

***Trimalaconothrus sculptus* Knülle** (Fig. 15)

Family: Malaconothridae Berlese

Length: 350–390μm

Previous known distribution: Palaearctic (Weigmann, 2006).

Previous known habitat: primarily in wet, oligotrophic bogs (Weigmann, 2006).

All specimens were collected by the Centre for Ecology and Hydrology during their Countryside Survey 2000 Project.

Records: **England** – nr. Santon Bridge, (NY10), Cumbria; from podsol soil, in a bog, 11.viii.1998 (six specimens); **Scotland** – nr. Carsphairn, Galloway Forest Park (NX59), Dumfries and Galloway; from podsol soil in a bog, 26.viii.1998 (one specimen); nr. Glenegedale, (NR35), Isle of Islay, Inner Hebrides, Argyll; from peat soil, in a bog, 29.vii.1998 (two specimens); nr. Kilchrenan, Trossachs National Park (NN02), West Dunbartonshire; from peat soil in a bog, 2.ix.1998 (two specimens); near Drynoch, (NG43), Isle of Skye, Inner Hebrides; from peat soil in a bog, 7.vii.1998 (one specimen); Scalpay, (NG63), Inner Hebrides; from peat soil in a bog, 11.vii.1998 (one specimen); nr. North Fearns, Island of Raasay, (NG63), Inner Hebrides, Highland; from gley soil dwarf shrub heath, 13.vii.1998 (one specimen); nr. Sallachy, Loch Long, to the east of the A890 road (NG93), Highland; from peat soil in a bog, 11.vii.1998 (two specimens); nr. Carnach (NH03), Highlands; from podsol soil acid grassland, 4.vii.1998 (one specimen); nr. Osdale, in the vicinity of the A863 road, (NG34), Isle of Skye, Highland; from peat soil in a bog, 4.vii.1998 (four specimens); nr. Geisiadar, (NB13), Isle of Lewis, Outer Hebrides; from peat soil dwarf shrub heath, 19.viii.98 (one specimen); nr. Dalhalvaig, in the vicinity of the A897 road (NC85), Highland; from podsol soil in a bog, 3.vi.98 (two specimens); nr. Ardantiobairt (NM65), Highland; from lithomorphic soil, mixed broadleaved and yew woodland, 27.vi.1999 (one specimen); nr. Port Mor (NM47), Isle of Muck, Argyll; bog (soil type not known), 6.vii.1999 (one specimen); nr. Scarista, in the vicinity of the A859 road, (NG09), Isle of Harris, Outer Hebrides; peat soil in a bog, 21.vii.1999 (one specimen); nr. Lubcroy, in the vicinity of the A837 road (NC30), Highland; from peat (organic) soil in a bog, 31.v.1999 (one specimen): nr. Mealabost, in the vicinity of the A857 road (NB45), Isle of Lewis; from peat soil in a bog, 19.vii.1999 (one specimen); nr. Lionel, in the vicinity of the A857 road (NB56), Isle of Lewis; from lithomorphic soil, improved grassland, 14.vii.1999 (one specimen).

***Trimalaconothrus vietsi* (Willmann)** (Fig. 16)

Family: as previous species

Length: 340μm

Previous known distribution: Palaearctic (Weigmann, 2006).

Previous known habitat: primarily in wet, oligotrophic *Sphagnum* peat bogs; also found submerged (Weigmann, 2006).

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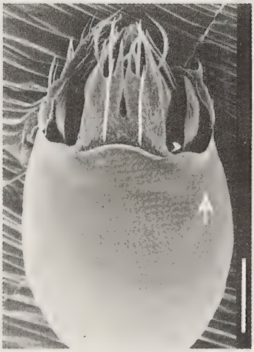

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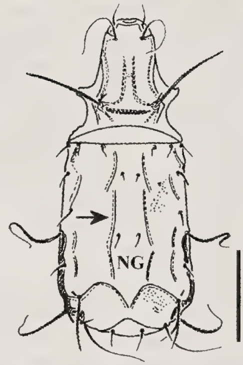

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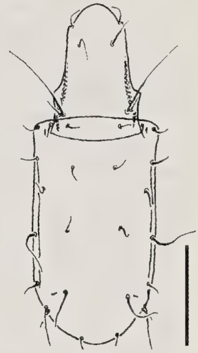

Fig. 13. *Oribatella litoralis* Strenzke (after author's SEM) arrow points to one of two remaining notogastral setae; left sensillus missing (scale bar = 100μm).
Fig. 14. *Paratritia baloghi* Moritz (after Moritz, 1966) lateral view (scale bar = 100μm).
Fig. 15. *Trimalaconothrus sculptus* Knülle (after Knülle, 1957) arrow points to a typical dorsal keel; NG = notogaster (scale bar = 100μm).
Fig. 16. *Trimalaconothrus vietsi* (Willmann) (after Knülle, 1957) (scale bar = 100μm).

Record: **England** – Abbots Moss, (SJ595687), Cheshire; from *Sphagnum* moss, xi.1996 (one specimen) (the late A. Scott).

The genus *Trimalaconothrus* Berlese was previously represented in Britain by four species: *T. foveolatus* Willmann, *T. glaber* (Michael), *T. maior* (Berlese) and *T. tardus* (Michael) (Luxton, 1996).

Trimalaconothrus sculptus and *T. vietsi* differ from the other members of the genus *Trimalaconothrus* in Britain in possessing a parallel sided notogaster: *T. sculptus* exhibits prominent dorsal keels and six pairs of genital setae; *T. vietsi* lacks dorsal keels and possesses five pairs of genital setae (based on key in Weigmann, 2006).

Discussion

The Checklist of Oribatids of the British Isles (Luxton, 1996) previously listed 135 genera and 303 species. The recent publications by Arroyo & Bolger (2007, 2008), Arroyo, Neville & Bolger (2009), Luxton (2000), Monson (1997, 1998, 2000, 2002, 2009), O'Connell (1994) and Weigmann & Monson (2004) increased the number of genera to 138 and species to 326. This paper increases the number of genera to 142 and species to 341.

All species listed are also found in Europe and further afield. Eight species were originally collected by the author; the remainder by organisations researching various aspects of soil ecology and by others undertaking site surveys. All species were initially identified by the author with the identity of one species confirmed by a specialist.

With an additional 38 species now known to inhabit Britain, together with the higher taxonomic changes highlighted in Subías (2004) and Weigmann (2006), the checklist of oribatid mites of the British Isles (Luxton, 1996) requires updating.

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PITTOSPORUM PSYLLID *TRIOZA VITREORADIATA* (HEMIPTERA: TRIOZIDAE) EXPANDING DISTRIBUTION AND HOST RANGE IN THE UK

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ABSTRACT

The pittosporum psyllid *Trioza vitreoradiata* (Maskell) (Hemiptera: Triozidae), an insect native to New Zealand, became established in south west England in 1993. It has since spread to many regions where its host plants (*Pittosporum* spp.) can be grown in England, Scotland and the Republic of Ireland. It has been recorded feeding on eight species of *Pittosporum*, including some that are not native to New Zealand, indicating that it may be able to damage a wide range of *Pittosporum* species. The effect *T. vitreoradiata* is having on the horticultural trade in the UK is discussed.

INTRODUCTION

The occurrence of pittosporum psyllid or pittosporum sucker *Trioza vitreoradiata* (Maskell) (Hemiptera: Psylloidea: Triozidae) in the UK is the first outside its native country of New Zealand. The first published record of this psyllid in the UK was from St Mawes, Cornwall in July 1993 (Martin & Malumphy, 1995). However, it is likely that the first discovery of *T. vitreoradiata* was from the Isles of Scilly earlier in 1993 (Andrew Tompsett, *pers. comm.*). By the end of 1994 it was found to be widespread in Cornwall and the Isles of Scilly (Martin & Malumphy, 1995). *Trioza vitreoradiata* can damage *Pittosporum* (Pittosporaceae) plants grown commercially, ornamentally or occasionally as a wind break, by leaf distortion and the production of honeydew and subsequent growth of sooty moulds. It is the only psyllid that feeds on *Pittosporum* currently found in the UK (Martin & Malumphy, 1995).

The presence of *T. vitreoradiata* can easily be detected by conspicuous shallow pit galls, caused by the feeding activity of the nymphs, these pits remain green as the leaf develops (Plate 5, Fig. 1). The eggs are attached to leaf surfaces by a short basal stalk; they are shiny white or yellowish and approximately 0.35mm long with an apical spine (Plate 5, Fig. 2). The dorsally flattened nymphs are usually bright green, but darken as they mature and are marginally fringed with short, fine glassy wax rods (Plate 5, Figs 3–4). The winged adults are yellowish-green and are 3–4mm in length (Plate 5, Fig. 5). Extensive notes on identification, including additional couplets to published keys to British Psylloidea (Hodkinson & White, 1979; White & Hodkinson, 1982) are given in Martin & Malumphy (1995). In New Zealand *T. vitreoradiata* overwinters as an adult, the females laying eggs in the spring. The complete lifecycle of this sexually reproducing species takes 60 days or more and the species can have up to five generations a year (Carter, 1949; Harrison, 1976; Martin, 2010). In Britain, it appears to be able to breed throughout the year on *Pittosporum* grown indoors and all developmental stages may be found during the winter months (C. Malumphy, pers. observ.).

Between 1993 and the end of 2010 more than 40 verified reports of *T. vitreoradiata* had been received by the Royal Horticultural Society (RHS) and Food and Environment Research Agency (Fera), enabling the updated distribution, host range

and assessment of the economic impact of *T. vitreoradiata* in the UK and the Republic of Ireland presented here.

Distribution in Britain and Ireland

Since 1993 41 verified reports of *T. vitreoradiata* have been received by the RHS and Fera (Fig. 1). The first published report was from St Mawes, Cornwall in August 1993, although it is now thought that *T. vitreoradiata* was first detected on the Isles of Scilly in June 1993 where the heavy infestations indicated that it may have been present for several years. By 1995 *T. vitreoradiata* had been found in several locations in Cornwall and the Isles of Scilly (Martin & Malumphy, 1995). The psyllid continued to be reported from Cornwall, the most recent report being Newquay 2008. It was reported outside Cornwall for the first time in 1998 at East Budleigh, Devon (11/1998), and was reported outside south west England in March 2002, when

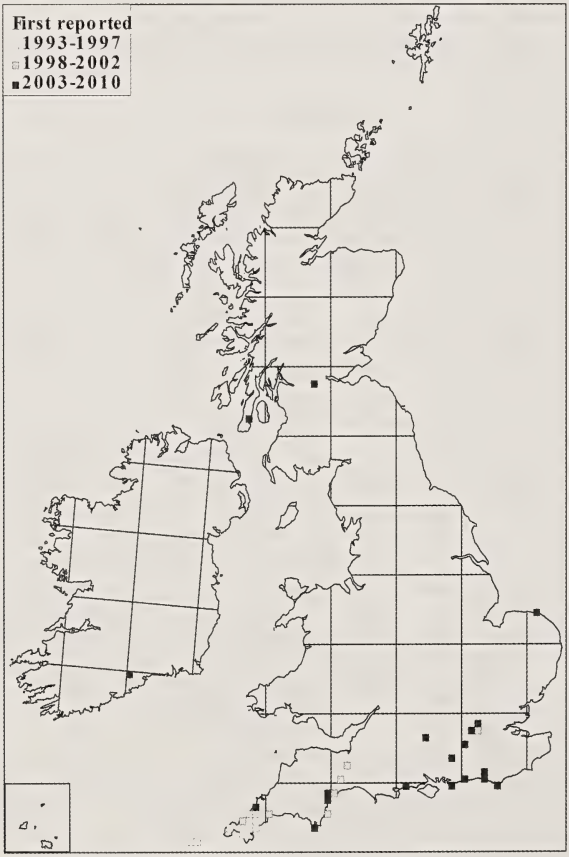

Fig. 1. Pittosporum psyllid, *Trioza vitreoradiata* distribution in Britain and Ireland. 10 km dots. RHS and Fera data (January 2011) produced using Dmap. This data will be made available via the National Biodiversity Network (*www.nbn.org.uk*).

a sample was received by the RHS from Kingston on Thames, Surrey. By the end of 2010 *T. vitreoradiata* had become widespread in southern England, broadly under a line between the Severn and Thames estuaries. Outside this area a single report has been received from Sheringham, Norfolk (11/2008). Pittosporum psyllid has been reported twice from Scotland, Campbeltown, Kintyre (02/2005) and Kilsyth, Stirlingshire (02/2009).

The psyllid was recorded in the Republic of Ireland at Cappoquin, Co. Wicklow on a commercial nursery in 2003 (O'Connor, Dunne, & Whelton, 2004). It was found in a botanical garden on Batz Island, off the coast of Normandy, France in 2007, where it had probably been present since 2005; and soon after was found near Roscoff and St. Pol-de-Leon on the French mainland (Cocquempot, 2008). Some of the localised spread of this psyllid is likely to be due to natural movement, *T. vitreoradiata* is a poor flier but excellent jumper (Malumphy, Cheek, & Martin, 1994). Over greater distances spread is more likely by the movement of infested host plants. In some cases the psyllid has been found on plants that had recently been imported from elsewhere in Europe; from France (Hassocks, West Sussex, 06/2005; Liphook, Hants, 08/2010) and possibly from The Netherlands (Kilsyth, Stirlingshire, 02/2009). However, *T. vitreoradiata* has not yet been reported from The Netherlands (Misfud *et al.*, 2010).

Host range

Trioza vitreoradiata is almost exclusively found on species of *Pittosporum* (Pittosporaceae), although it has been reported on *Hymenosporum flavum* Muell (Pittosporaceae) and *Feijoa sellowiana* (Berg) (Myrtaceae) in New Zealand (Martin & Malumphy, 1995). However, *H. flavum* is considered a very rare host and reports on *F. sellowiana* remain unsubstantiated (Martin, 2010). It has been recorded colonizing *P. colensoi* Hook, *P. crassifolium* Banks & Sol, *P. ellipticum* Kirk, *P. eugenioides* Cunn, *P. fairchildii* Cheeseman and *P. tenuifolium* Gaertn in New Zealand (Carter, 1949, Tuthill, 1952; Harrison, 1976; Martin, 2010). Martin & Malumphy (1995) reported that in Britain *T. vitreoradiata* had been found feeding on *P. crassifolium, P. tenuifolium* and

Table 1. Host records of the Pittosporum psyllid (*Trioza vitreoradiata*) reported in the UK (1993–2010, based on RHS and Fera data). Some infestations are on more than one host plant at a site.

Host	No. of reports	Frost Hardiness	Origin
Pittosporum spp.	19	Frost hardy to frost tender*	
P. crassifolium Banks & Sol.	3	Frost hardy, can withstand temperatures down to $-5°C$*	New Zealand
P. omeiense Chang & Yan	1	Probably frost hardy**	China
P. tenuifolium Gaertn	2	Frost hardy, can withstand temperatures down to $-5°C$*	New Zealand
P. tobira (Thunb.)	16	Half hardy, can withstand temperatures down to 0°C*	China, Korea, Japan
P. undulatum Vent	1	Half hardy, can withstand temperatures down to 0°C*	Australia

*Brickell (2008). **A small group of this species has been grown outdoors in a reasonably sheltered position at RHS Garden Wisley, Surrey since 1998. They have never shown any damage from frost (J. Armitage, *pers comm.*).

P. tobira (Thunb.). Reports received between 1995 and 2010 add *P. omeiense* Chang & Yan and *P. undulatum* Vent to the list of host plants (Table 1).

The genus *Pittosporum* contains approximately 200 species and the group is primarily native to Australasia, but some species are native to southern Africa and South East Asia (Brickell, 2008). In the UK and Ireland they are grown primarily as ornamental plants, in private gardens and for landscaping schemes, and as a foliage plant for the cut flower industry. *Pittosporum crassifolium* is naturalised in the Isles of Scilly, where it is often used as a windbreak (Martin & Malumphy, 1995). Three of the species (*P. omeiense*, *P. tobira* and *P. undulatum*) on which *T. vitreoradiata* has now been recorded in the UK are not plants native to New Zealand (Table 1). This may indicate that more plants in the genus *Pittosporum* are potential hosts for this insect.

Pittosporum species are frost hardy to frost tender, with frost tender species able to withstand short spells at temperatures below 0°C, provided the wood has been well ripened during the summer (Brickell, 2008; Table 1). Considering average minimum winter temperatures given in Brickell (2008), some species of *Pittosporum* can be grown out of doors throughout much of southern England (broadly in a line between the Severn and Thames estuaries) and most of the coastal regions of England and Wales. In Scotland *Pittosporum* should survive in the south west coastal areas and the central region between the Firth of Forth and Firth of Clyde; in the Republic of Ireland in parts of the south and west. The fact that all UK and Ireland records of *T. vitreoradiata* are within these regions indicates that it may be able to establish anywhere that it is currently possible to grow *Pittosporum* out of doors.

Natural enemies

In New Zealand predation of *T. vitreoradiata* has been observed by lacewings (Neuroptera: Hemerobiidae), predatory bugs (Hemiptera: Miridae) and several species of ladybird (Coleoptera: Coccinellidae), including the two-spotted ladybird *Adalia bipunctata* (L.), a UK native species (Carter, 1949; Martin, 2010). However, predation has not yet been documented in the UK.

In New Zealand two species of parasitoid wasp (Hymenoptera) have been reared from *T. vitreoradiata* nymphs; an undescribed species in the family Encyrtidae (Carter, 1949) and a *Tamarixia* sp. (Eulophidae). The *Tamarixia* sp. was first found in 1997 and is now very common in Auckland, where high levels of parasitism can occur in the autumn (Martin, 2010). A sample containing a high level of parasitised nymphs, from which the adult wasps had emerged or the pupae were dead (Plate 5, Fig. 4), has been received by Fera from a commercial nursery in West Sussex, UK (08/2010); however as no adult wasps were available no identification was possible. The plants, and presumably the parasitoids, were imported from France.

Discussion

It is clear that *Trioza vitreoradiata* is established in the UK and the Republic of Ireland, where it may be able to infest its host plants wherever they can be grown (i.e. in areas where the minimum winter temperature is rarely lower than −5°C). *Trioza vitreoradiata* has been found on *Pittosporum* species that do not originate from the pest's native New Zealand, and it is possible that *T. vitreoradiata* is able to feed on additional *Pittosporum* species to those listed.

The impact this pest has on plants has several elements. There is a direct loss to the plant by sap depletion, especially by the later nymphal instars. Young leaves react to the pest's feeding by forming shallow pit galls. These remain green and so may not

adversely affect photosynthesis, but as these leaves remain puckered and distorted, the aesthetic properties of the plant are diminished. The nymphs and adults excrete honeydew and sooty mould often grows upon it, giving the plants a black powdery appearance (Harrison, 1976). This damage will further reduce the aesthetic value of Pittosporums, both in private gardens and amenity plantings, and there may also be an increase in insecticide usage on what were previously relatively pest-free plants. Martin & Malumphy (1995) listed the economic effects of *T. vitreoradiata* damage to foliage of *P. tenuifolium* grown for use in the cut-flower industry, and noted that reduced vigour of *P. crassifolium* may diminish its effectiveness as a windbreak plant on the Isles of Scilly. In addition it is likely that there will also be some reduction in sales or the value of nursery stock at garden retail outlets and commercial nurseries. During 2010 outbreaks in commercial nurseries in Surrey and West Sussex caused severe economic damage to *Pittosporum* used for landscaping (Fera data). For example, at one nursery 300 × 25L and 300 × 10L plants with a retail value of £17,000 were all infested with pittosporum psyllid (and low numbers of cottony camellia scale *Pulvinaria floccifera* (Westwood) (Hemiptera: Coccidae)) and were unusable.

Acknowledgements

Thanks are due to James Armitage for botanical information, Jim O'Connor for comments on the presence of the psyllid in Ireland, and Andrew Gaunt of the Plant Health and Seeds Inspectorate for providing information on the psyllid at plant nurseries. This work was partly funded by Defra.

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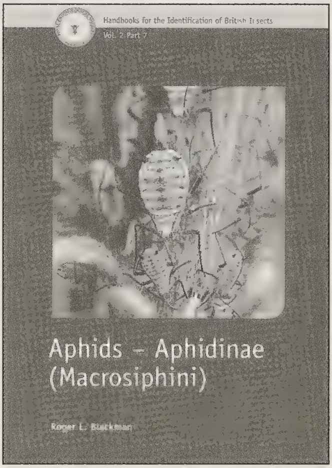
BOOK REVIEW



Aphids – Aphidinae (Macrosiphini) Handbooks for the Identification of British Insects. Volume 2 Part 7 by Roger Blackman. 414 pp plus CD. Published for the Royal Entomological Society by the Field Studies Council, 2010. Price £40. ISBN: 978-0-901546-91-3.

The two previous Handbooks in this series were on the subfamilies Calaphidinae, Chaitophorinae, Drepanosiphinae, Phyllaphidinae and Saltusaphidinae, published in 1977, and on the tribe Aphidini of the subfamily Aphidinae, published in 1984. This, the third handbook on aphids contains keys for identifying 305 species of the tribe Macrosiphini, a subfamily of the Aphidinae. These 305 species comprise half the British fauna of aphids. The keys are extremely well and lavishly illustrated mainly with black and white photographs of slide-mounted aphids, and there are further photographs providing more details of the morphology of the species on an accompanying CD.

In compiling the keys the author has not lost sight of the fact that they will not only be used by aphid specialists but also by field biologists for whom ease of identification is paramount. Roger Blackman has achieved this, without any loss of taxonomic rigour, by using characters that can be seen without resort to producing slide mounted preparations. In addition, great importance is placed on the value of one's knowledge of the identity of the host plant, which part is infested with the aphid and whether it is ant attended, thus reducing the number of possible species to which it could belong. However the detailed and easy to use keys are invaluable when there is a need to identify an aphid for which none of the above details are known.

Following the Introduction and a very useful and informative general account of the characteristics of aphids there are sections on Host plants of British Aphidinae, a Checklist of British Macrosiphini, Keys to un-winged, winged and winged males of genera of British Macrosiphini, and a very detailed Systematic Account of the genera which alone makes up 69% of the text. These are followed by informative chapters on "Collecting, rearing and studying aphids" and "Preservation and slide preparation", and the text ends with a glossary of the rather daunting terminology used in the description of the different morphs and life cycles of aphids.

Roger Blackman is to be congratulated on producing such a user friendly guide to the identification and biology of 50% of the British aphid fauna. He has set a very high standard for whoever is willing to complete the series and produce a similar account for the remaining 20%. Let us hope we shall not have to wait another 27 years. I have no hesitation in recommending this excellent Handbook to all who have an interest in aphids, whether amateur or professional.

Tony Dixon

THE PERSISTENCE OF THE SANDHILL RUSTIC MOTH *LUPERINA NICKERLII* SSP. *LEECHI* (LEPIDOPTERA: NOCTUIDAE) AT AN ISOLATED SITE IN CORNWALL, UK

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Abstract

The colony of the nocturnal moth *Luperina nickerlii leechi* Goater was studied between 1995 and 2009 on Loe Bar in Cornwall, where it persists as an isolated population separated from the nearest populations by over 300km. This study investigates the population size using transect studies, linked to detailed mapping of individual moths and the larval foodplant Sand Couch-grass *Elytrigia juncea*. There has been remarkable persistence in this single, small, isolated population but long-term trends indicate that the population may be gradually declining. Seventy percent of the recorded moths are female and males may find it easy to find females in the relatively small area of larval foodplant, which at its most extensive covers less than 20,000 m^2. Residence time at around 3.8 days allows time for females to mate and lay eggs. Restricted mobility ensures that moths do not lose touch with their habitat. The earlier the emergence the longer the flight period, so that factors which affect early emergence are probably beneficial.

Introduction

The Sandhill Rustic moth *Luperina nickerlii* (Freyer) is a medium-sized noctuid moth occurring in Europe mainly on dry xerothermic slopes but also (in Britain and Ireland and formerly in Brittany) in coastal locations. The moth is univoltine, the eggs being laid in August and September on grasses, inside the stems of which the larvae feed over winter, before moving down in early spring to feed on the crowns and roots; on softer substrates the larvae and the pupae are subterranean. The moths are nocturnal, flying in late summer. The type locality is Czechoslovakia (Emmet, 1991) and there are several subspecies throughout Europe (Karsholt & Razowski, 1996) including *nickerlii* (Freyer) in Germany, Prague and Bulgaria, *graslini* Oberthür and *tardenota* Joannis in France and *albarracina* Schwingenschuss in Spain. All, except possibly ssp. *tardenota,* occur widely in Europe. Four subspecies occur in Britain and Ireland, separated from each other by over 300km: *gueneei* Doubleday (found in north Wales and north-west England) (Doubleday, 1864); *knilli* Boursin (found in south-west Ireland) (Knill-Jones, 1965); *demuthi* Goater & Skinner (found in south-east England) (Goater & Skinner, 1995) and *leechi* Goater (restricted to Loe Bar in south-west Britain) (Goater, 1976). *Luperina nickerlii* ssp. *leechi* Goater was first discovered in Cornwall in 1974 when it was considered an interesting form of *Luperina testacea* (D. & S.), but subsequently described as a new subspecies of *L. nickerlii* on the basis of its silvery brown colouration, not found in other forms of the species.

Luperina nickerlii ssp. *gueneei* occurs in large populations on sand dunes in north Wales and the west coast of Lancashire (e.g. Wallace & Finnegan, 1994: Wallace, 2006). *Luperina nickerlii* ssp. *knilli* occurs widely on cliff tops along the south coast of the Dingle Peninsula in Ireland (Knill-Jones, 1965; A. Spalding, unpublished data). *Luperina nickerlii* ssp. *demuthi* occurs in extensive populations on saltmarshes in

south-eastern England (e.g. Spalding, 2002). In contrast, *Luperina nickerlii* ssp. *leechi* is restricted to a small area about 500m × 240m, where its larval foodplant Sand Couch-grass *Elytrigia juncea* occurs as a monoculture covering an area of less than 20,000m^2 (Spalding, 1991a). *Luperina nickerlii* ssp. *leechi* is of high nature conservation value, being restricted to one site, and has been classified as RDB1 (Waring, 1993). It can be characterized as a non-eruptive or latent species (Veldtman, McGeoch & Scholtz, 2007), having fully-functional wings, no sexual dimorphism and no physical defences, and being cryptic, solitary and as a sub-species monophagous; as such, it would not be expected to show sudden population explosions. It has recently been added to the British Biodiversity Action Plan list (JNCC, 2007) as a unique subspecies currently under threat and declining, using information on distribution and current status based on the results of the present study, which is designed to investigate the factors which may be linked to the persistence of this isolated colony.

Methods

Study area

The study was carried out on Loe Bar, Cornwall, UK, most intensively between 2002 and 2009, but using additional data collected at the same site between 1995 and 2001. The study area is a shingle beach facing south-west onto Mounts Bay, exposed to strong westerly winds and occasionally washed over by waves in major storm events (Plate 6, Fig. 1). The larval foodplant *Elytrigia juncea* occurs as a near monoculture over large parts of Loe Bar, especially near the sea, in NVC community SD4 (Rodwell *et al*., 2000).

Mapping

Almost nightly visits were made during the flight period and the position of each individual *L. nickerlii* located during these visits was mapped from 2003 onwards using a Trimble GEOXT GPS unit (made by Trimble Navigation Ltd) with the linked BoB (Beacon on the Belt) (used with the software GPS Pathfinder Office) and the European satellite system Egnos (European Geostationary Navigation Overlay Service) when available, with information transferred into MasterMap© and placed over the Ordnance Survey Mastermap digital topography base layer. Data were also post-processed for greater accuracy using RINEX data files from a local station from the National GPOS Network web site at: *http://gps.ordnancesurvey.-co.uk/active.asp* giving greater than 50cm accuracy.

Population trends

Moths were surveyed at night during the course of the flight period, generally mid-August to late September, between 2002 and 2009 inclusive. Searching for moths resting on the low-growing vegetation was by powerful battery-operated searchlight. Flying moths were also netted, identified and recorded, but the great majority were found at rest. Surveys generally started at 23.00h (previous work having indicated that this was the time of peak numbers (Spalding, 1991a)). A transect 464m long by 10m wide running SSE to NNW across the Bar was established in 1995 based on the Butterfly Monitoring Scheme methodology (Hall, 1981; Pollard, Hall & Bibby, 1986) and moths counted within this area. It made use of permanent site features to ensure consistency of orientation from year to year and was first monitored by the lead author in 1995 (Spalding, 1997), the first recorded use of this method for nocturnal

moths (Birkenshaw & Thomas, 1999). From 2003 onwards, transect information was obtained by extrapolation from detailed moth distributions mapped by GPS, a more accurate method than estimating whether individuals near the transect boundaries were within transects. Weekly transect counts were collated for Sandhill Rustics and the Index of Abundance calculated from the sum of the weekly means according to the standard butterfly recording method (Pollard, Hall & Bibby, 1986).

Movement

Mark–release–recapture observations were conducted on Loe Bar in 2003 and 2004, when most moths (a few were not marked, e.g. mating pairs) were given an unique pattern of painted spots using acrylic paints on one or both forewings, allowing them to be recognized if recaptured and their movement over a number of nights traced back to the time and position of first capture.

Residence time

Residence time for moths was calculated by plotting the best-fit line on the recapture results (numbers of days between the first and last capture) and using the equation, residence time b^{-1} where $b = (y-c)/x$ (b = the rate of decline; c = the intercept point on the y axis; y = the corresponding point on y equal to the intercept point on the x axis; x = days since first recapture (Watt *et al.*, 1987).

Results

Flight period and male:female ratio

A total of 1972 adult moths was recorded on Loe Bar between 1995 and 2009 (Table 1, Plate 6 Fig. 2). These results include all data from surveys and transect counts based on variable year to year effort and as such do not show exact population trends. The flight period generally lasted just over 30 days (mean 32.7 days), with mean peak numbers in early September. The total does not include recaptured marked moths, but may include some unmarked moths seen more than once, e.g. on successive nights. The earlier the appearance, the longer the flight period ($r = 0.876$; $p \leqslant 0.01$) (taken from the data when the actual flight period was recorded). Males emerged earlier than females (Fig. 1). The female:male ratio varied between 4:1 and 0.77:1. Only in 2000 were more males seen than females; female numbers appeared to fluctuate more widely than male numbers.

Note that in 2003 and 2004 greater effort was devoted to survey work, including the use of MRR, and large numbers of moths were found then. Nevertheless, there must be real concern over the recent very low numbers, allowing for the fact that there were equally low numbers in 1998 and 1999.

Transect results

A total of 484 moths was recorded along the constant effort transect between 1995 and 2009 (Table 2). The numbers seen in 1995 to 1997 at the beginning of the survey period were relatively high, but numbers declined thereafter with particularly low counts recorded as early as 1998/99. The annual index of abundance calculated from the sum of the weekly means showed a similar decline in moths with low values from about 2003 onwards.

The trend in the highest numbers seen on the transect shows a slightly more gradual decline to lower counts interspersed with occasional higher counts. With 20% positive and negative potential error values relative to each sample point

Table 1. Numbers of adult Sandhill Rustics recorded on Loe Bar 1995–2009.

Year	Total recorded	Nos of females	Nos of males	Length of flight period (days)	Date first seen
1995	289	232	57	46	14 August
1996	237	165	72	31	15 August
1997	83	53	30	35	20 August
1998	64	37	27	34	11 August
1999	39	26	13	25*	24 August
2000	133	65	68	27*	20 August
2001	60	34	26	31	15 August
2002	126	82	44	36*	16 August
2003	167	124	43	39*	16 August
2004	246	192	54	34*	16 August
2005	195	130	65	37*	17 August
2006	172	132	40	32*	17 August
2007	77	57	20	36*	19 August
2008	43	32	11	27	22 August
2009	41	25	16	21*	23 August
Totals	1972	1386	586		

*Actual flight period; the other dates represent the minimum observed flight period.

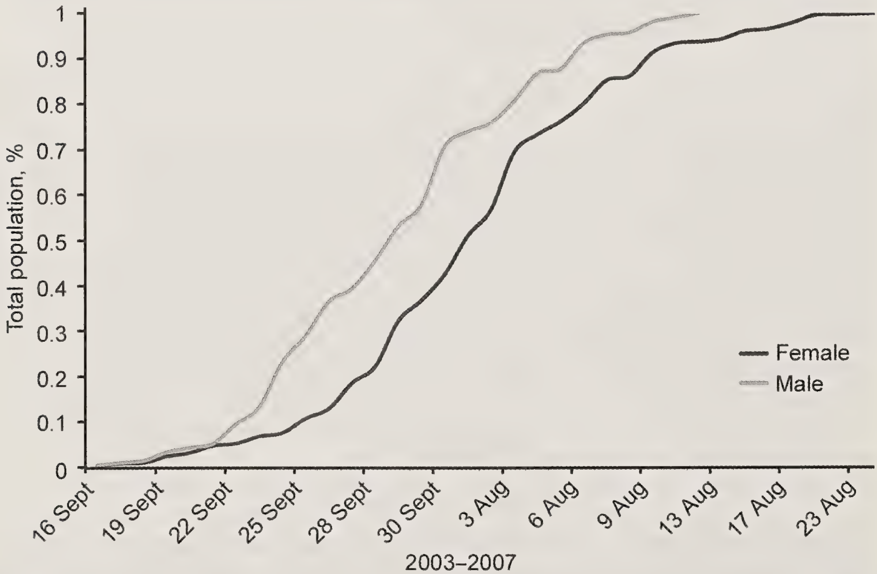

Fig. 1. Cumulative totals for male and female Sandhill Rustics on Loe Bar 2003–2007.

(Fig. 2), the trend line ($r^2 = 0.334$) passes through 6 of the 15 sample points; analysis of variance of the regression indicates that the decline is significant ($p = 0.024$). Further sampling over the years is required to establish whether there is an ongoing population decline, or whether the population has declined to a period of relatively constant but low numbers since 2003.

Table 2. Numbers of Sandhill Rustics recorded along the transect across Loe Bar 1995–2009 and estimates of abundance.

Year	Total seen on the transect over the flight period	Maximum number of moths per transect	Index of Abundance (the sum of the weekly means)
1995	95	12	32
1996	57	18	58
1997	33	9	33
1998	10	4	10
1999	13	5	13
2000	36	13	36
2001	14	7	14
2002	53	11	23.8
2003	20	4	5.3
2004	46	5	7.6
2005	31	6	10.3
2006	22	5	11
2007	11	3	7.5
2008	17	4	10
2009	26	8	17.5
Total	484		

Residence time and the movement of moths across Loe Bar

There were 10 recaptures in 2003 and 14 in 2004 (Table 3) and all but one involved female moths. Distances moved ranged from 4m to 349m with a mean movement of 86.6m. Moths may actually move more indirectly between capture and recapture sites and hence may have travelled greater distances. One moth was recaptured twice, living at least 10 days and moving 88m and then 17m. Residence time (b^{-1}) of individual moths equated to 3.79 days ($b = (y-c)/x$) (Fig. 3). The 10 days survived by a single moth indicates that individual residence time may be longer than that estimated as mean survival.

Discussion

Persistence and flight period

The flight period varied between 21 and 46 days with a mean of 32.7 days. Flight period length can be highly variable in some butterflies (e.g. Brakefield, 1987; Warren 1987a). Lepidopteran species with short flight periods may be more prone to extinctions, especially when combined with monophagy (Mattila *et al.*, 2006) or a narrow habitat breadth (= single habitat association) on low fertility sites (Nilsson, Franzén & Jönsson, 2008). Short flight periods will reduce the opportunity for Lepidoptera to outlast short-term bad weather events or habitat changes (e.g. Nilsson, Franzén & Jönsson, 2008). Possible threats to *L. nickerlii* on Loe Bar include stochastic events such as stormy weather and flooding and this species certainly has narrow habitat-breadth and is on a low fertility site. Early emergence is probably beneficial if leading to longer flight periods which may enable moths to better survive short-term influences. As a result, factors encouraging early emergence are likely to lead to long-term persistence of the population.

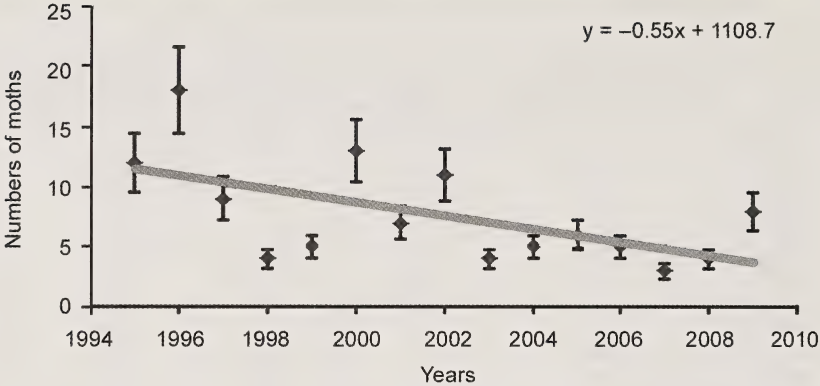

Fig. 2. Regression analysis of the highest numbers of moths seen on the transect 1995–2009 against years since the counts started.

Table 3. The residence time and movement of marked moths on Loe Bar 2003–2004.

Date marked	Sex	Date recaptured	Date 2nd recapture	Days between captures	Distance moved metres (m)
27.viii.03	F	1.ix.03	–	5	19
28.viii.03	F	30.viii.03	–	2	4
28.viii.03	M	30.viii.03	–	2	24
29.viii.03	F	30.viii.03	–	1	255
29.viii.03	F	30.viii.03	–	1	7
30.viii.03	F	31.viii.03	–	1	34
31.viii.03	F	1.ix.03	–	2	30
31.viii.03	F	2.viii.03	–	2	152
1.ix.203	F	2.ix.03	–	1	23
2.ix.03	F	3.ix.03	–	1	67
16.viii.04	F	21.viii.04	26.viii.04	5 & 5	88.3 & 17.2
23.viii.04	F	24.viii.04	–	1	2.35
27.viii.04	F	28.viii.04	–	1	53.6
27.viii.04	F	29.viii.04	–	2	349
28.viii.04	F	30.viii.04	–	2	16.5
29.viii.04	F	30.viii.04	–	1	71.5
30.viii.04	F	1.ix.04	–	2	11.7
30.viii.04	F	1.ix.04	–	2	9.92
30.viii.04	F	1.ix.04	–	2	44.5
31.viii.04	F	1.ix.04	–	1	143
29.viii.04	F	2.ix.04	–	4	107
2.ix.04	F	3.ix.04	–	1	260
5.ix.04	F	6.ix.04	–	1	279
5.ix.04	F	10.ix.04	–	5	9.62

Persistence and residence time

Residence time on Loe Bar for individual Sandhill Rustics moths was 3.8 days. In captivity adults may survive for up to 17 days (females) and 5 days (males) (Spalding, 1991b). Published residence times for nocturnal moths are hard to come by, although some data are available for diurnal species, e.g. the residence time for *Dysauxes*

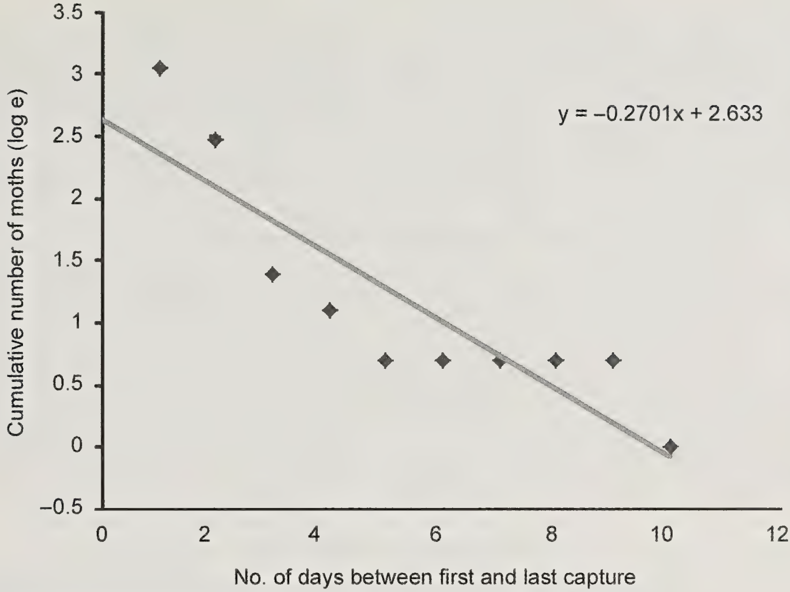

Fig. 3. Residence times (days) of adult moths on Loe Bar 2003–2004.

ancilla (L.) (Lepidoptera: Ctenuchidae) has been calculated as 2.6 days for males (Betzholtz, 2002). For butterflies residence times for non-overwintering species may range from 2 days for *Mellicta athalia* (Rottemburg) (Lepidoptera: Nymphalidae) (Warren, 1987b) to 34 days for males and 33 days for females of *Lycaena helle* (D. & S.) (Lepidoptera: Lycaenidae) in western Germany (Fischer, Beinlich & Plachter, 1999); the modal residence time from mark-release-recapture studies on butterflies is below 10 days (García-Barros & Fartmann, 2009). Residence time for Sandhill Rustics is within this range. Females in captivity emerge with large numbers of eggs within their abdomens, mate on the first night if males are available, start laying within 2 days and will lay up to about 300 eggs (pers. obs.) if they survive long enough. Egg-laying is rapid, eggs being laid in batches of up to 60 eggs at a time (pers. observ.). Residence time of 3.8 days is therefore long enough to ensure at least some population replacement, even if the full egg load is not laid.

The movement of adult moths

Distances moved were generally very small, the average movement being 86m (Table 3). The distances moved by Lepidoptera can be very small e.g. less than 45m for *Yponomeuta padellus* (L.) (Brookes & Butlin, 1994) and 61m for *Lycaena helle* (Fischer, Benlich & Plachter, 1999). The majority of the Sandhill Rustic movements were localised and longitudinal across the habitat with very little lateral movement; one moth travelled almost the entire length of the site (349m). Similar within-habitat movement may occur with the moth *Agrotis ripae* (Hübner) (Lepidoptera: Noctuidae) which stays within its long thin habitat along the high tide mark on sandy shores (Young, 1997). Small within-site movement ensures that females stay in touch with their prospective mates and their habitat and foodplant. It also acts to reduce the risk of displacement beyond the habitat in very exposed and windy sites.

Persistence and male – female ratio

At Loe Bar many more females than males were seen, although the precise sex ratio changed over the course of the flight period. Uneven male: female ratios are generally unusual in Lepidoptera (Clarke, 1984; Shreeve, 1992) but it is likely that the effect observed is a real one – transect recording schemes often result in bias towards males as females fly less and are less noticeable when egg-laying (Dennis & Sparks, 2006). However, in this case many of the recorded moths were noted at rest, rather than in flight, as usually applies to most butterflies recorded on transects. High female ratios are beneficial in small discrete populations where females are densely spaced and where males can easily find females. High female ratios can also occur where there are different levels of activity between males and females, e.g. where males broaden their temperature tolerance range and their heightened activity compensates for their lower numbers (Casula & Nichols, 2003). This may be true of Sandhill Rustics, where the males fly more readily (Spalding & Young, in press) and are likely therefore to cover a greater part of the habitat than females. Males also appear to emerge earlier than females and are ready to mate when females appear, enhancing the chances of successful pairing. They can also mate more than once, so reducing any adverse effect of a female-biased sex ratio.

Persistence and habitat area

The total habitat area (i.e. the area of *Elytrigia juncea*) available for Sandhill Rustics at Loe Bar is just under 2ha. The actual breeding habitat at Loe Bar may be less than this total area, as often plants do not represent usable resources unless they grow in suitable microhabitats (e.g. Roy & Thomas, 2003); in some areas of Loe Bar (perhaps 20–40%) Sandhill Rustics are never found, even though the larval foodplant is present. The actual breeding habitat may therefore be about 1ha. Sixteen of the British butterfly species (all with closed populations) can apparently survive in a minimum breeding area of 0.5–1ha (Warren, 1992), and the Sandhill Rustic territory is well within this range. Some moth species can survive for long periods in small areas. For example, a colony of *Pareulype berberata* (D. & S.) (Lepidoptera: Geometridae) survived for over 100 years from the 1860s to the 1990s (when the population was destroyed by fire) in a small length of narrow hedgerow not more than a few hundred metres long (e.g. Waring, 2000). The small habitat area is therefore unlikely in itself to be critical in reducing persistence of Sandhill Rustics here, but does significantly reduce the maximum population size.

Persistence and isolation

Many populations of Lepidoptera species exist in a network of suitable habitats in a metapopulation structure (Hanski & Gilpin, 1991) and their survival may depend on the protection of these metapopulations (e.g. Thomas & Jones, 1993; Hanski, 1994; Thomas, 1995; Saccheri *et al.*, 1998; Wahlberg, Klemetti & Hanski 2002); local populations within colonisation range may be regarded as belonging to a single metapopulation (e.g. Thomas & Harrison, 1992). This may be true of the other subspecies of *L. nickerlii*: *gueneei* in northern Britain where new colonies are occasionally founded (Burkmar & Jones, 2008), *demuthi* on the saltmarshes of south-east England and *knilli* on the cliffs of south-west Ireland. Metapopulations are characterised by colonisations and extinctions (Thomas, 1995) and lepidopteran species normally existing in metapopulations may not survive in isolation (Menéndez & Thomas, 2000). Sandhill Rustics at Loe Bar are completely isolated from all other

known sites and may therefore not be able to survive in the long term. Unfortunately there is no knowledge of how long this population has survived at Loe Bar, although the sand bar may have been formed as a barrier beach moving onshore as Holocene sea levels rose after the last glacial period (May, 2007) and the moth has developed consistent racial characteristics, which itself suggests long persistence. The annual Index of Abundance indicates that the population varies from year to year; extinction may be most likely at its lowest point.

Persistence and population fluctuation

The reasons underlying the fluctuations in the population of *Luperina nickerlii leechi* are unknown. Stochastic elements may be important in small scale habitats (such as occurs on Loe Bar), where stochastic "noise" may push species into extinction (Southwood & Comins, 1976; Lande, 2002; Wilson & Roy, 2009), especially changes in weather which may be considered responsible for causing many of the fluctuations in insect populations (e.g. Davidson & Andrewartha, 1948; Singer & Thomas, 1996; Webb & Pullin, 1996). Isolation from other populations may also be critical, leading to loss of genetic variability (Nève, 2009) and loss of viability through inbreeding (e.g. Saccheri *et al.*, 1998; Cassel *et al.*, 2001; Nieminen *et al.*, 2001). Demographic stochasticity may be significant where the effective population size is limited by an unequal sex ratio (e.g. Gerber, 2006). It is suggested here that limited adult movement and the relative abundance of females contributes to the persistence of Sandhill Rustics at Loe Bar, and that factors leading to an early flight period are beneficial to its survival, but it remains highly threatened and vulnerable to adverse and unpredictable habitat factors.

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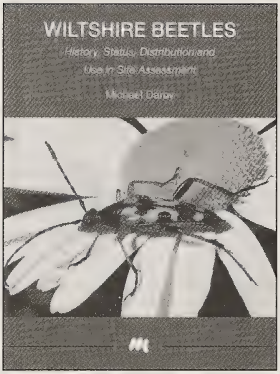
BOOK REVIEWS



Wiltshire Beetles: History, Status, Distribution and Use in Site Assessment by Michael Darby. 2009. 355pp, 22 colour plates, and 155 colour figures. Soft back, £23.99 plus £3.87 p&p. ISBN 978-0-9558506-1-5. Malthouse Books, Sutton Mandeville, Salisbury SP3 5LZ, http://www.malthouse books.co.uk/, Sales enquiries email admin@ malthousebooks.co.uk

As a great fan of county lists I cannot fault Darby on this publication. The introductory chapters on habitats, principal sites, scarce species in the county, and details on woodland and grassland indicator species are well written and informative. My particular favourite chapter on the history of beetle recording in the county gives details from an early 19th century cleric to modern day professional entomologists and is well researched and of interest to anyone with a fondness for the history of British entomology. In all, the book lists 1,839 species, with information on habitat preferences in the county, locations, dates and names of recorders. Although there are no maps, the data are presented in an easy to follow manner, and the text is broken up nicely with colour illustrations of 125 rare and notable species. Overall, this publication deserves a place on any keen entomologist's bookshelf.

DARREN MANN

Kingdom of ants: José Celestino Mutis and the Dawn of Natural History in the New World by Edward O. Wilson and José M. Gómez Durán. 99pp. Johns Hopkins University Press. ISBN 13: 978-0-8018-9785-6. Hardback £13.00.

Ah – E.O. Wilson, *More ants* you say on looking at the title of this review, and to a point you are right, but there is more to this slim book than just another book about ants. In describing the work of José Celestino Mutis the authors have a much more general point to make – the nature of scientific method and how this must be judged according to the accumulated experience of the time and not with the benefit of hindsight. Mutis was in Central America in the middle and end of the 18th Century, contemporary with Linnaeus, indeed in touch with him, but not aware of the ultimate result of Linnaeus' work. Nevertheless, he came to the decision that, if he were to understand the many, obviously different ant types around him, he needed to relate them to each other in a systematic way. In doing this he soon discovered that the names accorded to these by the local inhabitants clearly served their restricted needs – which ones were fiercest, for instance; but did not distinguish between all the fierce ones. In this book the struggles Mutis encountered in studying his ants are documented largely by referring to Mutis' own writings; writings concerned with both structure and behaviour. Several blind alleys are described by Mutis himself; as one reads one becomes an observer of the development of Mutis' thought. The key message, and one which is equally relevant for scientific endeavour in our modern times, is "*that a very careful observation is needed to know for certain if this is the result of . . .*" (fighting or sunstroke in chapter 10, to name one instance), a theme which clearly occupies much of Mutis's attention. A charmingly constructed and readable diversion – with a very relevant message. Highly recommended.

MIKE EDWARDS

MACROPSIS MEGERLEI (HEMIPTERA-AUCHENORRHYNCHA: CICADELLIDAE) NEW TO BRITAIN

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ABSTRACT

The cicadellid leafhopper *Macropsis megerlei* (Fieber) is reported from a single site in north Wales. This record represents the first for the British Isles.

INTRODUCTION

During 2010 several unfamiliar leafhoppers were collected from Morfa Harlech, one of the most extensive sand dune systems in Merionithshire (VC48). They were identified using Biedermann & Niedringhaus (2009) as *Macropsis megerlei* (Fieber), a species not previously recorded in Britain.

Within the subfamily Macropsinae, there are 13 species of *Macropsis* known from Britain (Le Quesne & Payne, 1981). They are found on a variety of host plants: most are arboreal and are associated with willows (*Salix*), poplars (*Populus*) and elm (*Ulmus*), while two feed on *Rubus* species and a single species occurs on stinging nettle *Urtica dioica*. The genus is generally regarded as one of the more difficult to identify amongst the British Auchenorrhyncha, since many species show a variable external morphology and also have similar male genitalia. The facial markings are often important identification characters.

Two males and a single nymph of *M. megerlei* were swept from fixed dune grassland at the south end of Morfa Harlech (SH574303) on 2.vii.2010 (Figs 1–2). The flora in this area is dominated by extensive stands of burnet rose *Rosa pimpinellifolia*, one of the main host plants of *M. megerlei* on the continental mainland (Wagner, 1964). Morfa Harlech supports strong populations of several other insects which are reliant on this food plant, for example the moths *Anticlea badiata* (D. & S.) (Lepidoptera: Geometridae), *Epiblema incarnatana* (Hübner) (Lepidoptera: Tortricidae), and the nationally scarce *Stigmella spinosissimae* (Waters) (Lepidoptera: Nepticulidae).

DESCRIPTION

Length: ♂ 4.0–4.5 mm, ♀ 4.5–5.0 mm. A fairly small *Macropsis* species; equal in size to the closely-related *M. fuscula* (Zetterstedt). The two adult males appeared very distinctive in the field, showing a striking contrast between the uniformly reddish-brown forewings and pale yellowish forebody (Plate 7, Fig. 1).

Pronotum yellowish with two dark marks on the anterior margin, adjacent to the eyes and the posterior margin broadly dark across the entire width (Figs 1a, Plate 7, Fig. 1). Scutellum pale yellowish-white and marked with two indistinct dark triangles. Face yellowish with dark thyridial spots, large comma-shaped discoidal spots and rather prominent ocelli. Fore and middle tibiae marked with several broad dark bands (Fig. 2).

The male genitalia of *M. megerlei* are very similar to those of *M. fuscula*: the aedeagus is scythe-shaped with a slender and evenly curved shaft (Fig. 1b).

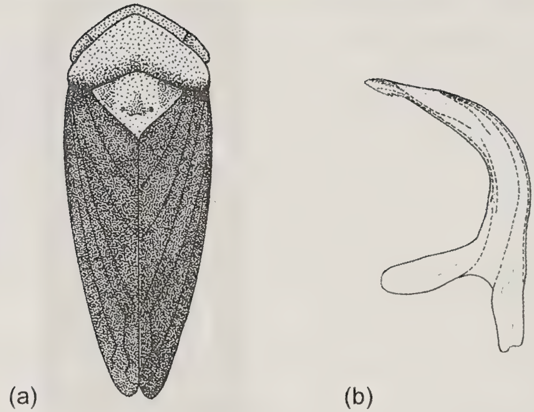

Fig 1. *Macropsis megerlei* male, after (Biedermann & Niedringhaus, 2009) and lateral view of aedeagus (Ossiannilsson, 1981).

Fig. 2. *Macropsis megerlei* male (Morfa Harlech, 2 July 2010). © T Bantock.

Ecology and distribution

Macropsis megerlei is associated with *Rosa* species growing in warm situations and is known from much of the western Palaearctic including continental Europe, north Africa and the Middle East. In Germany it is associated mainly with burnet rose *R. pimpinellifolia* and is occasionally found on other *Rosa* species such as *R. rubiginosa* (H. Nickel, *pers. comm.*). The species overwinters as an egg, has a single generation between July and August and although fairly widespread, is

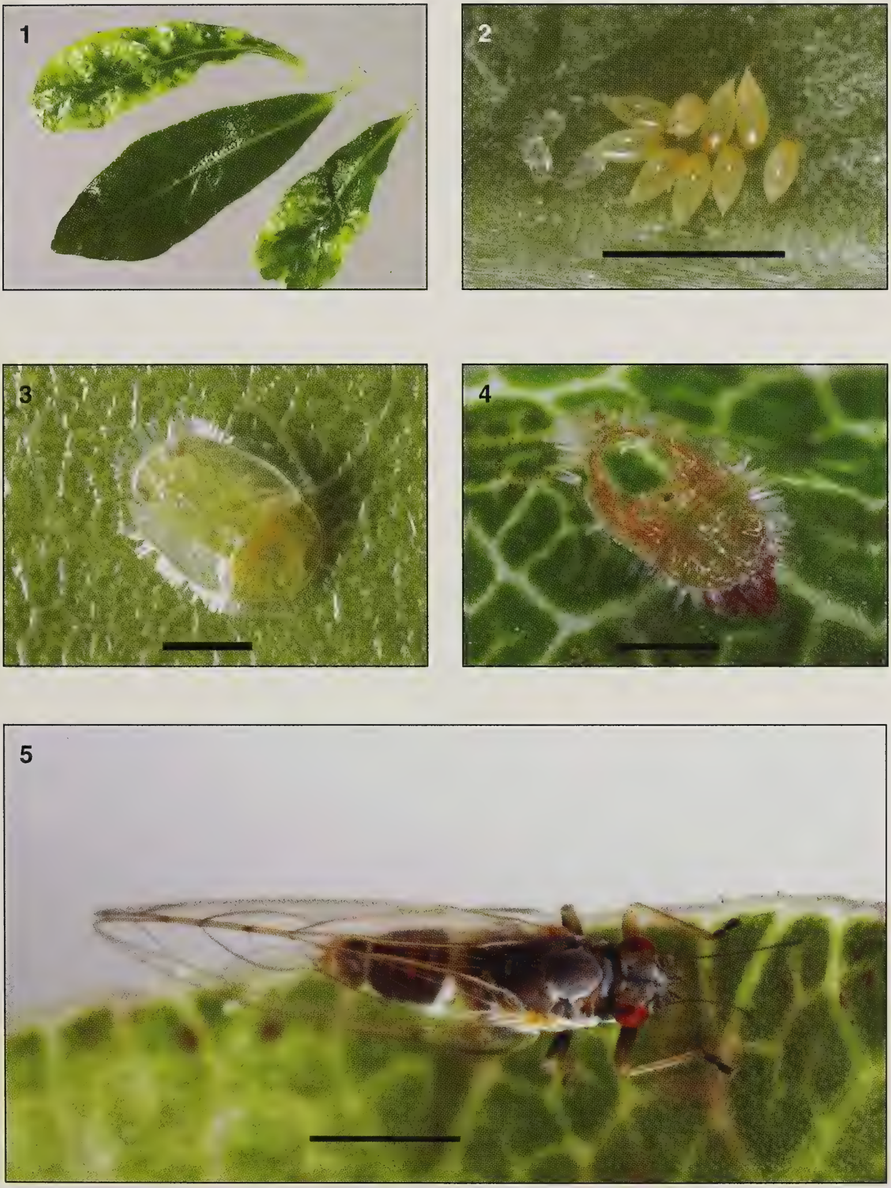

PLATE 5. Figs 1–5. Pittosporum psyllid *Trioza vitreoradiata*. 1: Foliage, upper and lower leaves showing pittosporum psyllid damage; 2: eggs; 3: nymph; 4: nymph with hymenopterous parasitoid emergence hole; 5: adult. Scale bar = 1mm. © Fera.

PLATE 6. Figs 1–2. Sandhill rustic moth. 1: Loe Bar, Cornwall, showing the large area of sand couch grass, the type locality for *Luperina nickerlii* ssp. *leechi*; 2: A mating pair of *Luperina n.* ssp. *leechi*, September 2005. Photos: A. Spalding.

PLATE 7. Figs 1–2. 1: *Macropsis megerlei* male, Morfa Harlech, 2 July 2010. Photo: T Bantock; 2: *Lasiogossum sexstrigatum* female, Merstham, Surrey, 5 June 2008. © G. Collins.

PLATE 8. Figs 1–4. *Mesochorus lilioceriphilus*. Male – 1: adult; Female – 2: head, showing face not separated from clypeus; 3: vertex; 4: abdomen with ovipositor.

classified as RD2 (Endangered) (Nickel & Remane, 2002) suggesting that it is a low density species which is rarely common at any given site. Its association with roses, difficult plants to sample effectively using standard techniques such as sweeping, means it could be easy to overlook.

The discovery of *M. megerlei* on the north west coast of Wales certainly suggests that it is a long overlooked resident species in Britain, as opposed to a recent colonist. It should be looked for in other large dune systems where *R. pimpinellifolia* is abundant, as well as at inland sites where this plant occurs on limestone pavement.

Macropsis megerlei could well be close to the northern limit of its range in Britain, given that it is absent from much of Scandinavia with just two records from Norway in the late 1800s (Ossiannilsson, 1981). As such it is perhaps unlikely to be common and may not be found outside the specialised habitat from which it is reported here.

Acknowledgements

The author wishes to thank Herbert Nickel and Alan Stewart for useful correspondence regarding *M. megerlei* and comments on this manuscript.

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SHORT COMMUNICATION

Preference of *Issus coleoptratus* (Geoffroy) (Issidae) for garden shrubs in England. – A search of a 5m tall *Pittosporum tenuifolium* 'Garnettii' tree in the garden for the psyllid *Trioza vitreoradiata* (Maskell) on 15 March 2011 proved unsuccessful, but many individuals of the cicadellid *Empoasca vitis* (Göthe) were found, as might be expected for an evergreen species. What was totally unexpected though, were even greater numbers of second and third instar nymphs of the planthopper *Issus coleoptratus* (Geoffroy). Up to 12 individuals at a time were recorded on the beating tray – quite remarkable, more than would be expected from holly, its native host hereabouts. It is interesting to note that this tree was growing next to a cut-back specimen of *Elaeagnus pungens*. This shrub has also been observed to support reasonable numbers of nymphs and adults of *I. coleoptratus*, throughout most months of the year, suggesting it is a host plant for this species. I used to think of *Issus* as a woodland species, perhaps it is not. – J. S. Badmin, Coppice Place, Selling, nr Faversham, Kent ME13 9RP.

LASIOGLOSSUM SEXSTRIGATUM (HYMENOPTERA: APIDAE, HALICTINAE) NEW TO BRITAIN

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Abstract

A female *Lasioglossum sexstrigatum* (Schenck), a species not previously known in Britain, was found in a sandpit near Merstham in Surrey in June 2008. Despite several searches, no further specimens of this bee have been recorded from this site. Recent evidence shows this species is widely distributed in central mainland Europe.

Introduction and discovery

Small black bees, particularly those in the genus *Lasioglossum*, form a difficult area of study for the student of aculeate Hymenoptera, but can be identified with some confidence by careful use of a key and with reference to a reliably named collection.

One such insect, a female bee taken at a flooded sandpit near Merstham in east Surrey, caused particular difficulty. This bee was small (6mm long) and black, the angles of the propodeum were rounded, and the marginal area of tergite 1 was shining, almost smooth, and without punctures. The specimen had one very distinctive feature: there was a narrow band of dense white hairs towards each side of the apical margin of each of tergites 2 to 4 (Plate 7, Fig. 2). The bee was given several different provisional names before being identified conclusively as *Lasioglossum sexstrigatum* (Schenck), a European species not previously recorded in Britain.

The site is owned by WBB Minerals, part of the Sibelco Group, and since 2002 has been managed as a nature reserve by the Surrey Wildlife Trust under the name of Spynes Mere. Beside the north-eastern corner of a large lake, a steep south-facing exposure of sand forms a low cliff about four metres high. This cliff diminishes towards the east and merges gradually with the gentle slope of the eastern shore, where the sand has become largely covered by moss over the last few years.

The reserve wardens had identified this sandy cliff as a habitat of particular interest, and had asked me to record invertebrates there. Access was difficult at first. A malfunctioning lock forced me to climb a barbed-wire fence, and I then had to squirm on my belly below a thicket of hawthorn and blackthorn before reaching the north-eastern corner of the lake. On my next visit, the stiff lock had been freed, and I took loppers and secateurs to clear a narrow path through the thorny thicket and also free the base of the cliff from a luxuriant growth of bramble.

The bee in question was taken on 5 June 2008 as it landed on the mossy bank at the head of the eastern shore. The first indication that this specimen was out of the ordinary was when it came to a contradiction in the published key of Perkins (1922). This suggested that it might be *L. semilucens* (Alfken), a species not known from Britain when Perkins wrote his key. Turning to a draft key to *Lasioglossum* by G. R. Else, the specimen came to the couplet separating *semilucens* from *rufitarse* (Zetterstedt), but was of intermediate size and a poor match for both species, especially since a female *semilucens* was available for comparison. Next, a European key was tried, that to the *Halictus* and *Lasioglossum* of Switzerland by Amiet *et al.* (2001), in which the specimen came directly to the species-pair *sexstrigatum* and

sabulosum (Warncke). At various times, it became labelled with all four of the above names, with an ever-increasing number of question-marks!

Fortunately, some female *L. sexstrigatum* were also available, collected in Slovakia by C. W. Plant and identified by Zsolt Józan. These appeared identical to the British specimen. My identification was confirmed at the Natural History Museum in London by Michael Kuhlmann who had encountered this species in Germany. The European literature and specimens were provided by David Baldock, who also arranged this visit to the museum with an urgency that soon became apparent. The species was added to his *Bees of Surrey*, with my full agreement, on the day before the book went to press (Baldock, 2008).

There is a complication in that the species long known as *L. sexstrigatum* has recently been split, although the British specimen is *sexstrigatum sensu stricto*, and the other segregate, *sabulosum* (Warncke, 1986), is unlikely to occur in Britain. Warncke's proposal was initially rejected by other authors, such as Ebmer (1988) and Westrich (1989), who found that the characters listed did not give a consistent and convincing separation into two taxa when applied to the specimens they examined. However, a large-scale study of the problem was made by Herrmann & Doczkal (1999), who examined 695 specimens from public and private collections from Switzerland and Germany. They concluded that *L. sabulosum* was indeed a valid species. Some of the characters put forward by Warncke proved unreliable when applied to a larger sample, but Herrmann & Doczkal added further characters for separating the two species. *Lasioglossum sexstrigatum* was by far the commoner species in northern Germany, while both species were equally common in southern Germany and Switzerland. There was a strong preference in *L. sexstrigatum* for sites on sandy soil, such as sandpits, dunes, and woods on sandy ground, while *L. sabulosum* was found in a variety of habitats. This division into two species, *sexstrigatum* and *sabulosum*, is now widely accepted, for example in Poland (Pesenko *et al.*, 2000; Celary & Wisniowski, 2003).

Once its importance was recognised, the site was visited several times in the late summer and autumn, in order to try and confirm the presence of a colony and to collect a male, but without success. A further visit on 2 August 2009 was similarly unsuccessful. The number of *Lasioglossum* species recorded for the reserve was increased to nine, five as single specimens, including the female *sexstrigatum*.

Any description of the male, in the absence of a British specimen, must necessarily be both tentative and secondhand, being based on Continental literature and on examination of the few male specimens from Europe in the collections of the Natural History Museum. This male is small (length 5–7mm) and wholly black or, in part, dark brown (except for tip of clypeus, labrum, mandibles, tarsi, extreme base of tibiae, and underside of antennae, which are all at least partially yellowish). Two distinctive characters are that the face is rounded (very slightly broader than long), and that the antennae are short, with segments 5 to 11 only a little longer than broad (not more than 1.25 times). Tergite 1 is shining, with very fine and well-scattered punctures, and there are no spots or bands of hairs at the base of tergites 2 and 3, but just a trace of the hair bands on the apical margins that distinguish the female.

As I write, one male specimen of *L. sexstrigatum s. lato* is available for examination. It was collected at Debrecen in eastern Hungary by C. W. Plant, and has two very striking features. The mandibles are long and narrow, reaching the bottom of the opposite eye, and are crossed when at rest. This is, however, a character of the sibling species *sabulosum*. Herrmann & Doczkal state that the mandibles are normal in length in *sexstrigatum*, and normal to very long in *sabulosum*.

The second distinctive feature of this specimen is the shape of the back of the head when viewed from the side. This area, the gena, is drawn out into a broad tooth, which is another character of *sabulosum*. The tooth is variable in size and may be absent in both species, particularly in *sexstrigatum*. Where present, it is broad in *sabulosum*, but short and narrow in *sexstrigatum*. However, even in the absence of this tooth, there is almost always a distinct angle behind the base of the eye when the head is viewed in profile, and this is a good character for separating *sexstrigatum* from all other British species of *Lasioglossum* (G. R. Else and M. Kuhlmann, *pers. comm.*).

The discovery of a single female *Lasioglossum sexstrigatum*, in characteristic habitat and far from the coast, suggests that the species is already established and breeding in Britain, but this needs to be confirmed. This species should be searched for, or considered as a possibility, whenever recording the Hymenoptera of any site on sandy soil in south-east England. Natural migration is possible, for the species is common in the Netherlands (Peeters, Raemakers & Smit, 1999).

Acknowledgements

The author is grateful to George Else for much helpful advice, to Graham Collins for taking the photograph, to David Notton for allowing me to inspect the collections of the Natural History Museum, to Michael Kuhlmann for confirming my identification and showing me the important paper by Herrmann & Doczkal, to David Baldock for generously lending me specimens and books from elsewhere in Europe, to the Surrey Wildlife Trust, especially ranger Steve Bolton, for inviting me to study invertebrates at Spynes Mere, and to Colin Plant for preserving specimens of all orders on his trips to the European mainland.

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TONY PICKLES
BENHS President 2011–2012

I have been privileged to have been involved with the inner workings of the Society for many years, firstly as Auditor and then as Treasurer so that becoming President is perhaps less daunting for me than it might otherwise have been. Nevertheless it is a great honour and I look forward to my year with keen anticipation.

I am a baby-boomer, born in Gravesend, Kent in 1946. I was brought up in the town but spent much time as a child with my grandparents who lived on a fruit farm not far away. It was from my grandfather that my interest in nature probably first came. Certainly I spent many hours walking the farm with him as he quietly pointed out birds, insects and signs of animals. He kept bees and being allowed to help with these was an especial delight. I can recall the first insect that really made an impression on me, a bee-fly when I was about six. But soon I was seduced by moths and amateur lepidopterist has been my status ever since.

After a stint at the local grammar school and at an army school in Germany I studied to become a Chartered Accountant in Worcestershire before living and working in London after qualifying. It was during this period that I joined our Society and started going to meetings in South Audley Street as well as exploring the countryside at weekends and in holidays with my collecting companions Alec Harmer and Rex Harvey. Through the Society I met many people who, without exception, were only too glad to help and encourage; Bernard Skinner and Ted Wild, Don Russwurm, Graham Howarth and Bob Watson to mention a few. I started attending field meetings and my circle of entomological friends grew steadily.

After seven years in the City I joined a small accountancy practice in Lymington on the edge of the New Forest where I have lived for the past thirty five years. Living, working and raising a family with Cathy in this small south coast town has given me many opportunities to collect and study Lepidoptera. Firstly in the rich local habitats, then throughout the British Isles and latterly further afield, as my interests

have expanded to include the European fauna. I have been particularly attracted by the idea of 'North' and have collected in Arctic Lapland three times now with Alec Harmer, who remains my most frequent collecting companion. It was on a Society trip to Slovenia in 2003 that my dormant interest in the European fauna was kick started.

During my working life I have delighted in serving many of the community of New Forest commoners who pursue a unique way of life. I have been able to view conservation from both sides, that of the farmer and forester as well as the naturalist and perhaps I was able to bring something of this to my input when Buglife, the invertebrate conservation charity, was formed and I served a spell on the board of directors.

I am enthusiastic about the British Entomological and Natural History Society and believe it fulfils a unique role in the entomological world. The mixture of professional and amateur, of specialists in different insect groups and different disciplines, its accessible library and collections, meetings, workshops and facilities for study combine with opportunity for friendship and mentoring in a way of which we can all be proud.

Journal Binders

A considerable number of members will no doubt have thought about binding their copies of the Society's Journal but have come to the conclusion that the costs are prohibitive. An alternative and cheaper option is provided by the "Cordex" system manufactured by Modern Bookbinders Ltd; this being a traditional style binder with a series of spring-loaded cords to hold the magazines in place.

Standard binders are bound in an attractive navy blue waterproof material and manufactured in three sizes; the 210 mm × 150 mm size fits the journal perfectly and currently costs £ 6.24 each plus carriage dependent on numbers ordered e.g. £4.11 for two.

Thirteen cords are included thus allowing for three years issues to be accommodated within each volume binder. In addition Gold Blocked clear self adhesive labels can be supplied at extra cost if required.

I have certainly found the binders a very useful and easy way to file away my entomology journals. For further information consult the website at *www.modernbookbinders.com* – JOHN PHILLIPS, Maytime, St Peter's Road, Hayling Island, Hampshire PO11 0RT.

Exhibition Photographer wanted

The Editor would like to hear from anyone who is willing to act as official photographer at the Society's Annual Exhibition in November. Dr Joe Botting has taken on this rôle for the past few years but is now on sabbatical in China and has had to step down. Details of the Editor's email address and phone number are given on the inside front cover of the journal.

THE HYPERPARASITOID *MESOCHORUS LILIOCERIPHILUS* (HYMENOPTERA: ICHNEUMONIDAE), AN ADDITION TO THE PARASITOID COMPLEX OF THE LILY BEETLE IN BRITAIN

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ABSTRACT

The hyperparasitoid *Mesochorus lilioceriphilus* Schwenke is reported new to Britain as a result of investigations into the parasitoid complex of the lily beetle, *Lilioceris lilii* (Scopoli). Notes are given on *M. lilioceriphilus* and the other parasitoids of *L. lilii* found in the UK.

INTRODUCTION

The lily beetle *Lilioceris lilii* (Scopoli) (Coleoptera: Chrysomelidae) is found throughout much of the northern temperate zone. It is a pest of lilies and fritillaries (*Lilium* and *Fritillaria*: Liliaceae) in parts of mainland Europe and an introduced pest in the UK and North America (Rämert *et al*., 2009). The parasitoid complex of lily beetle in Europe has been studied as part of a biological control programme which resulted in three species being released in the USA (Haye & Kenis, 2004; Casagrande & Tewksbury, 2007). The complex consists of four hymenopteran larval parasitoids, one hyperparasitoid, one egg parasitoid and some generalist tachinid (Diptera) parasitoids (Table 1).

Two of the hymenopteran parasitoids, *Lemophagus errabundus* (Gravenhorst) (Ichneumonidae) and *Tetrastichus setifer* Thompson (Eulophidae), have previously been reported as being present in the UK (Cox, 2001; Salisbury, 2003). In 2003 and 2004 *L. lilii* larvae were collected from the Royal Horticultural Society Garden, Wisley, Surrey (TQ0659) and reared to collect adult parasitoids. In the spring after collection three species of parasitoid emerged, *T. setifer, L. errabundus* and *Mesochorus lilioceriphilus* Schwenke (Hymenoptera: Ichneumonidae). This is the first time that *M. lilioceriphilus* has been reported in the UK. Observations on this species and the other parasitoids of *L. lilii* in the UK are presented.

METHODS: PARASITOID COLLECTION AND REARING

Using methods described in Salisbury (2003), *L. lilii* larvae were collected weekly from *Lilium* at the RHS Garden, Wisley, Surrey (TQ0659) and reared in the laboratory during the spring and summer of 2003 and 2004. In 2003, 616 larvae were collected and 372 in 2004. The larvae were reared singly in ventilated glass tubes (75mm $\times$ 25mm), filled with a 1:1 coarse sand/ peat mix; leaves of *Lilium regale* Wilson were provided as a food source, replenished as necessary. This was carried out in the laboratory where temperatures were 24°C $\pm$ 5°C and a natural daylight cycle. Beetle larvae that died were dissected to establish whether parasitoid larvae were present. All of the hymenopteran parasitoids of lily beetle larvae overwinter in their host's pupal chambers (Gold *et al*., 2001), thus tubes from which an adult *L. lilii* had not emerged by the end of October of each year were emptied and pupal cells

Table 1. Characteristics of the parasitoid complex of the lily beetle *Lilioceris lilii* in Europe.

Taxonomy	European distribution	Life cycle*	Hosts**
Hymenoptera: Ichneumonidae			
Lemophagus errabundus (Gravenhorst)	Widespread, UK	Univoltine, solitary May–June.	*Lilioceris* spp.
Lemophagus pulcher (Szépligeti)	Widespread (not UK)	Partly bivoltine, solitary July–August	Chrysomelidae: Criocerinae
Diaparsis jucunda (Holmgren)	Widespread (not UK)	Univoltine July	*Lilioceris* spp.
Mesochorus lilioceriphilus Schwenke	Widespread, UK	Partly bivoltine, solitary June–August	*Lemophagus* spp.
Eulophidae			
Tetrastichus setifer Thomson	Widespread, UK	Univoltine May–August. Gregarious	*Lilioceris* spp.
Mymaridae			
Anaphes sp. (undescribed)	France, Switzerland	Egg parasitoid. Plurivoltine, gregarious	Unknown alternate hosts
Diptera: Tachinidae			
Meigenia species	Widespread		Chrysomelidae

After Haye & Kenis, 2000; Haye, 2000; Gold *et al.*, 2001; Kenis *et al.*, 2002; Gold, 2003; Haye & Kenis, 2004; Rämert *et al.*, 2009. *Times of larval infestation **Host tests for biological control programme under laboratory conditions.

placed in a Petri dish in an incubator at 4–6°C for six months, to overwinter. The tubes were brought up to room temperature (22°C) at the beginning of April 2004 or 2005 and examined daily. After four weeks any pupal cells remaining from which no parasitoid had emerged were dissected to determine if parasitism had taken place.

Results

Three species of parasitoid emerged from lily beetle collected in 2003 and 2004 (Table 2). One of these parasitoids had not previously been identified from Britain; this was confirmed as the hyperparasitoid of *Lemophagus* species, *Mesochorus lilioceriphilus*, by comparison with paratypes by Dr Klaus Horstmann (Universitaet Wuerzburg) (Plate 8, Fig. 1). Specimens of this species have been retained by K. Horstmann, and deposited with the Natural History Museum, London, and the RHS insect reference collection at Wisley. Nineteen specimens emerged, 15 males and 4 females.

Over the two years, 21% of *L. lilii* larvae were parasitised (204 parasitised larvae from 988 collected). *Tetrastichus setifer* occurrence peaked in May with 8 (6%) larvae affected, and only 1 (< 1%) larva collected in June; less than 1% (9) of larvae collected over both years. *Lemophagus errabundus* parasitised 56 (41%) larvae collected in May and 118 (31%) in June, or 18% (178) of all larvae collected. *Mesochorus lilioceriphilus* occurred in 19 (5%) larvae collected in June, 2% of all larvae collected. Only one parasitised larva was collected in July (which produced *L. errabundus*); no parasitoids were found in larvae collected in August or September.

Table 2. Monthly summary of results of lily beetle larvae collected and reared at Wisley Garden, Surrey in 2003 and 2004. Bracketed figures represent percent values

2003	May	Jun	Jul	Aug	Sep	Total
Number collected	76	238	168	114	20	616
No. died (no parasitoids)	24 (32)	45 (19)	40 (24)	33 (29)	2 (10)	144 (23)
No. adults emerged	15 (20)	105 (44)	128 (76)	81 (71)	18 (90)	347 (56)
Tetrastichus setifer	6 (8)	1 (<1)	0	0	0	7 (1)
Lemophagus errabundus	31 (41)	71 (30)	0	0	0	102 (17)
Mesochorus lilioceriphilus	0	17 (7)	0	0	0	17 (3)
2004	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Number collected	63	138	105	61	5	372
No. died (no parasitoids)	28 (44)	60 (43)	31 (30)	27 (44)	3 (60)	149 (40)
No. adult emerged	6 (10)	29 (21)	73 (70)	34 (56)	2 (40)	144 (39)
Tetrastichus setifer	2 (3)	0	0	0	0	2 (<1)
Lemophagus errabundus	26 (41)	47 (34)	1 (<1)	0	0	74 (20)
Mesochorus lilioceriphilus	0	2 (1)	0	0	0	2 (<1)

Discussion

Mesochorus lilioceriphilus

Mesochorus lilioceriphilus (Plate 8) is an obligate solitary hyperparasitoid of *Lemophagus* parasitoids of *Lilioceris lilii* and *L. merdigera* (L.) (Haye, 2000). The primary host of *M. lilioceriphilus* is reported to be *Lemophagus pulcher* (Haye, 2000); however this species has not yet been recorded in the UK and its host in England is presumably *L. errabundus*. The low rate of hyperparasitism (< 1%) is similar to that found in mainland Europe (Haye, 2000). The lifecycle of *M. lilioceriphilus* is presumed to be similar to that of its *Lemophagus* hosts, overwintering as adults within *L. lilii* cocoons, but with adults emerging slightly later than the primary parasitoid (Haye, 2000). When the primary parasitoid is bivoltine (*L. pulcher* (Szépligeti)) a second generation of *M. lilioceriphilus* can occur (Haye, 2000). However, the primary parasitoid in the UK (*L. errabundus*) is univoltine and so it can be assumed that *M. lilioceriphilus* is *de facto* univoltine in the UK.

The genus *Mesochorus* is easily recognised amongst the British ichneumonid fauna by the following combination of characters: fore wing areolet large and diamond-shaped; hind wing lacking second abscissa of *Cu* (nervellus not intercepted); face not separated from clypeus, forming uniform, slightly convex surface; female with ovipositor needle-like, sheaths stiff and glabrous; male with parameres elongate and thin. These features are illustrated in an online identification key to British subfamilies of Ichneumonidae (*http://www.nhm.ac.uk/resources-rx/files/ich-key-2_11-reduced-95113.pdf*).

Mesochorus is by far the largest genus of Mesochorinae, with 66 species currently recorded from Britain and Ireland (Broad, 2011). Schwenke (1999) revised the European fauna of Mesochorinae and described *M. lilioceriphilus* in a supplementary paper (Schwenke, 2000). However, these publications are of limited use when attempting to identify *Mesochorus* species in general and *M. lilioceriphilus* in particular. For example, despite what Schwenke (2000) says, *M. lilioceriphilus* will not key to *M. slawicus* Schwenke in his 1999 key to species as the temples of

M. lilioceriphilus are clearly shorter than the eye width (see Plate 8, Figs 2–3). *Mesochorus* species seem to have narrow host ranges (Horstmann, 2006) so any reared from *Lilioceris* / *Lemophagus* species are likely to be *M. lilioceriphilus*. Here we illustrate a male (Plate 8, Fig. 1) and a female (Plate 8, Figs 2–4) to aid recognition of this species when reared from *Lilioceris* larvae.

Parasitism

Combined parasitoids of the lily beetle have been found to parasitise 25% to 94% of *L. lilii* larvae in mainland Europe (Haye & Kenis 2000; 2004; Rämert *et al.*, 2009). With 21% of larvae producing parasitoids in this investigation and 27% reported in Salisbury (2003) it appears that parasitism rates are currently towards the lower end of the European range in the UK. This may be due to the UK currently having fewer species of parasitoid than mainland Europe. The dominant parasitoid in most of Northern and Western Europe is *Lemophagus errabundus* (Haye & Kenis 2000, 2004, Rämert *et al.*, 2009). From the results presented here it is apparent that this species is also the dominant parasitoid of *L. lilii* in at least part of the UK. *Tetrastichus setifer* is dominant in Germany and *Diaparsis jucunda* (Holmgren) (Hymenoptera: Ichneumonidae) (a species not yet found in the UK), is dominant in Southern Europe (Haye & Kenis, 2000; 2004).

In mainland Europe the parasitoids differ in phenology: *T. setifer* attacking larvae throughout the summer and *L. errabundus* attacking larvae in the spring and early summer; *L. pulcher* and *D. jucunda* parasitise larvae primarily in July (Kenis *et al.*, 2002; Haye & Kenis, 2004). However, in the UK it appears that both *T. setifer* and *L. errabundus* are early season parasitoids, being found in May and June.

The first confirmed report of *T. setifer* in the UK was from East Kent in 1997 (Cox, 2001). This species has since been recorded from Essex, Surrey, Sussex, Kent, Middlesex, Suffolk, Cambridgeshire and East Yorkshire (Cox, 2001; Salisbury, 2003; 2008). It is possible therefore that *Tetrastichus setifer* is as widely distributed as its host as it is present in areas where *L. lilii* has become established relatively recently (Salisbury, 2003). *Lemophagus errabundus* was reared from *L. lilii* larvae collected from Essex in 1998, and has since been recorded in Surrey, Sussex and Middlesex (Salisbury, 2003; 2008). The hyperparasitoid *Mesochorus lilioceriphilus* has only been recorded from Wisley Garden, Surrey; however, it may be more widely distributed as no investigations have been made at other locations.

None of these parasitoids seem likely to be native to the UK as extensive host testing as part of a biological control programme has shown that they are specific to the genus *Lilioceris* (Gold *et al.,* 2001; Kenis *et al.*, 2002) or, in the case of *M. lilioceriphilus*, the *Lemophagus* parasitoids of the genus *Lilioceris* (Haye, 2000). *Lilioceris lilii* is the only representative of the genus in the UK and is an established alien (Salisbury, 2003). It is unknown how these parasitoids became established in the UK, or how long they have been here. As well as inadvertent introduction, another possibility is that these parasitoids arrived in the UK as a result of natural range expansion following an increase in the geographical range of their host, as has been found for parasitoids of newly arrived leafmining Lepidoptera (Godfray *et al.*, 1995). It is possible that *L. pulcher* and *D. jucunda,* which are widespread in Europe, may be accidentally introduced into the UK in the future.

Acknowledgements

The authors are grateful to Klaus Horstmann for confirming the identification of *Mesochorus lilioceriphilus*. We thank Wolfgang Bopp for translating some German

text, Mark Kenis and Tim Haye for the information on the parasitoid complex and Andrew Halstead for critically reading the manuscript.

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COUNCIL, OFFICERS' AND OTHER REPORTS FOR 2010

Council Report

There were only six Council meetings in 2010 as the December meeting had to be postponed as a heavy snowfall would have made it difficult or impossible for many Council members to attend. On average sixteen Council members attended each meeting and once again the venue was the South Place Ethical Society's Conway Hall in Holborn. Although a little plain, this venue suits us well and we must thank the SPES for the use of their room.

It is still proving difficult to balance the loss of members through death, resignation and failure to pay subscriptions with the recruitment of new members. Thus there has been a small drop in overall membership from 822 in 2009 to 819 at the end of 2010. Nevertheless we should be encouraged that this year we recruited forty new members. We welcome them and hope they will enjoy many years of membership. Perhaps some among them will one day match the achievement of four of our members, C. R. B. Baker, P. J. Baker, H. B. Ellerton and R. Long, who completed fifty years continuous membership at the end of the year and were elected Special Life Members. Alas the deaths of seven members were reported to the Society this year, including that of the Revd Anthony Harbottle, a Special Life Member who joined the Society in 1948. Nineteen members resigned during the year and seventeen were struck-off for non-payment of their subscriptions.

Much of the Council's time this year has been taken up with matters relating to the Pelham-Clinton Building. As reported last year Wokingham District Council agreed to surrender the under-lease of their exhibition area attached to our building for £33,000. Completion day for the sale was not until 7th May. The Society was greatly assisted in this purchase by a donation of £10,000 from Graham Howarth, the 'father' of the Society, who is now in his 80th year of membership. The Council decided that the room should be named the Graham and Helen Howarth Room in recognition of Graham's generosity and in memory of the many years of service his late wife, Helen, gave to the Society. The sub-committee considering the future uses of the Howarths Room recommended that it should be used for both talks and workshops as well as providing some extra storage space on shelves and in cupboards. The roof space might also be used for storage subject to a surveyor's report. The Council agreed that sufficient tables and chairs should be purchased to equip the room as suggested. It was also agreed that the glass-fronted cupboards in the Library should be sold and replaced with shelving and lockable cupboards. The Council also accepted a further suggestion that a door be put in the wall between the Library and the Howarths Room. Some decorating and electrical work would also be needed and the external door to the Howarths Room would need to be replaced by a fire exit door. An appeal was made to members for donations to assist with these proposals and, together with a separate donation toward the cost of tables and chairs, this has raised £2058. It is hoped that all this work will have been completed by the time of the next report.

Recently we have had a number of problems with the air conditioning system in the Pelham-Clinton Building. As it has exceeded its design life by some years this should be expected. A major breakdown at the beginning of the year left us with the ability to increase temperature and humidity but without the ability to

lower either temperature or humidity. The Council's opinion was that the air conditioning is essential in order to maintain our collections of specimens and books in good order. Quotations for the replacement of the system were obtained from three companies. Two were for very similar amounts. One offered a completely new system whereas the other was essentially replacing the current system. The Council decided to choose the new system in the belief that it would be cheaper to run and maintain. The only drawback being that the existing equipment in the roof space and the Collections Room would be replaced by a single unit which for reasons of size will be installed in the Library. As a result there will be some extra noise there. The Council is very grateful to Martin Albertini for the time he has spent dealing with the effects of the breakdown of the old system, finding suppliers and arranging for quotations for a new system. The new system will be installed by our current air conditioning engineers, PACE Services Ltd, in February 2011 at a cost of £17,427. We have, therefore, committed ourselves to some £55,000 of expenditure on the P-C Building. The Treasurer will be commenting on this in his report.

A further development at Dinton Pastures has been the imposition of parking charges on our members and visitors using Wokingham District Council's car park. In doing this they denied the existence of an agreement, of which there is no written record, that has allowed us free parking for the past seventeen years.

At the beginning of the year the Society was asked to comment on DEFRA's consultation paper giving recommendations for species to be added or removed from Schedules 5 and 8 of the Wildlife and Countryside Act. This is part of what has become a long drawn-out 5th Quinquennial Review of the Act. The Society responded positively to DEFRA's recommendations for the three insect taxa involved in the review. In doing so we disassociated ourselves from the response of the other Invertebrate Link organisations which sought action in England to protect two burnet moth taxa which are only found in Scotland. Your Council took the view that the authorities in England should not and could not be expected to take action, on a matter that was properly the concern of the Scottish legislature, until a decision has been reached in Scotland. We were, however, able to persuade Invertebrate Link that this was not the time to propose the addition of a whole tranche of species, including the Bedstraw Hawkmoth, to the list of protected species. John Phillips and Raymond Uffen continue to represent the Society on Invertebrate Link committees.

In September the Secretary attended the final meeting of the Moths Count steering group on which he has represented the Society since the project was initiated. The Society is pleased to have been able to support this Butterfly Conservation project in various ways including the provision of small grants. The project has brought a better understanding of moths to many people and, of greatest importance to our members, will result in the first distribution atlas to cover all the UK's macromoths. This will be published at the end of the year. Although there will be no more funding from the Heritage Lottery Fund for this project, Butterfly Conservation intends to maintain the distribution mapping aspect of it. We are sure you will want your Society to give whatever support it can to the continuation of this work in which many of you have participated.

The year has seen the Society's, now usual, programme of meetings and workshops. One day meetings, arranged by Ian McLean, were held at the Bristol City Museum, the Oxford University Museum of Natural History and the Cambridge University Museum of Zoology. These meetings were well attended and we should thank the local organisers, Ray Barnett, Darren Mann and William

Foster respectively, together with the museums for allowing us to use their facilities. The annual one day meeting for coleopterists was held at Dinton Pastures. Ian McLean also arranged a programme of twelve workshop meetings covering various groups of Coleoptera, Diptera and Hymenoptera, Myriapods and some general aspects of identification and curation. One of the workshops was held in the new Angela Marmont Centre in the Natural History Museum, the others were held in our own premises. Understandably Ian McLean is finding arranging all these meetings time consuming and the Council has decided to create the post of Regional Secretary who will be responsible for arranging the one day meetings. Claudia Watts has agreed to take on this rôle. There were seventeen open days at the Pelham-Clinton Building during the year and most of these were overseen by Peter Chandler. His commitment is much appreciated. We have been aware for a time that some members are dissatisfied with the cost and/or format of the Society's Annual Dinner. So this year a buffet style meal was arranged at the Strathmore Hotel which is a short walk from our Exhibition venue. This move proved a success and was enjoyed by the members and visitors who attended and was, in part, increased by the unplanned sharing of the bar area with a hen party that had over-run its time slot. We intend to have the Dinner there next year. The Exhibition remained at Imperial College's Sherfield Building. The Attendance Book was signed by 184 members and visitors, a smaller number than usual as attendance over the previous ten years has averaged 222. The number of exhibits was also reported to be reduced. There seems to be no obvious reason for this. We must thank Mike Simmons for the extra work involved in making arrangements for the Dinner in a new place and for his usual skilful masterminding of the Exhibition. Paul Waring drew up a programme of twenty-one field meetings for the year. All but three of these meetings were in the southern half of England and, of these, half were from Devon and Hampshire. There was one meeting in Yorkshire, one in Scotland and one in Wales. We thank Paul for the effort he puts into ensuring we have a full programme and remind members that Paul can only improve the geographical spread of meetings if members volunteer to act as meeting leaders in localities where there are no meetings.

A facsimile reprint of the *Field Guide to the Smaller British Lepidoptera* was printed towards the end of the year. The year also saw the sale of the last copy of *British Soldierflies*. A revised reprint of this is in preparation. At the suggestion of Malcolm Storey the Society signed an agreement with the Biodiversity Heritage Library (BHL), based at the Smithsonian Institution Libraries, Washington, DC, to digitise all but the most recent ten volumes of the Society's serial publications back to 1879. There is no charge for this service and the digitised copies are now available to the public to view, search and download free of charge from the BHL website. There are a few gaps in the coverage but these are being resolved. A rolling programme should ensure that one additional volume is added each year so that only the ten most recent volumes are not digitised. We are the first UK entomological society to take advantage of this service.

This is my penultimate report on behalf of the Council as I will be retiring as Honorary Secretary at the 2012 AGM. The Council urges any member who would like to take up the challenge of becoming Hon. Secretary, with the likely benefit of an honorarium, to contact me or any other member of the Council.

JOHN MUGGLETON

Treasurer's Report 2011

Financial year to 31 December 2010

The Society has again produced a small surplus in cash terms and the market value of our investments has also risen, substantially by £44,715, although investment income dropped sharply.

Capital expenditure consisted of the purchase of the lease for the Graham and Helen Howarth Room at Dinton Pastures, amounting to £34,000 with associated costs. This was partially funded by a donation from Graham Howarth of £10,000. A fund was set up to provide for the refurbishment of the room and by the close of the year donations from members totalled £3,378.

A new air conditioning system for Dinton Pastures has been ordered for installation early in 2011, costing £17,427. This together with the planned printing of new editions of existing books will probably require the conversion of some of our investments into cash in the first quarter of the 2011 financial year.

I would like to thank Roger Hawkins for his continuing work with subscriptions and Tony Pickles for his advice in preparing the accounts.

Thanks also to Alec Harmer and Tony Pickles for the work they have done in auditing the accounts. Members Alan Philips and Phil Porter have kindly agreed to audit next year's accounts.

A full set of accounts will be lodged at Dinton Pastures or may be obtained on application to the Treasurer.

John Flynn

Statement of Financial Activities in pounds sterling for the year ended 31st December 2010

	Un-restricted Funds	Restricted Funds	Endowment Funds	Total Funds 31.12.10	Total Funds 31.12.09
Incoming Resources	£	£	£	£	£
Bequests and donations	–	13878	–	13878	–
Subscriptions	12306	–	–	14119	14319
Investment Income	3743	2344	832	6919	8061
Trading Income	1293	7466	–	8759	7903
Sundry Income	2436	–	–	2436	1088
Total Incoming Resources	27244	23688	832	44298	31171
Resources Expended					
Direct Charitable Expenditure:					
Cost of Journal & Distribution	16245	–	–	16245	9006
Cost of facility at Dinton Pastures	–	5287	–	5287	6721
Members Meetings & Services	8784	–	–	8784	9199
Library & Curation	1149	–	–	1149	2056
Grants	495	–	–	495	762
Depreciation	2225	2575	–	4800	4435
	31473	7862	–	36760	32179

Other Expenditure					
Management costs	2434	–	–	2434	2292
Trading costs	2288	–	–	2288	577
	4722	–	–	4722	2869
Total Resources Expended	33620	7862	–	41482	35048
Net Resources before transfers	(13842)	15826	832	2816	(3877)
Net Incoming /Outgoing Resources	(13842)	(15826)	832	2816	(3877)
Gains & Losses on Investment assets					
Realised	–	–	–	–	–
Unrealised	24187	15148	5380	44715	15639
Net movement in Funds	10345	30974	6212	47531	11762
Fund Balances brought forward at 1st January 2010	78555	263499	21181	363235	351473
Fund Balances carried forward at 31st December 2010	88900	294473	27393	410766	363235

Balance Sheet as at 3lst December 2010

	2010	2010	2009	2009
Fixed Assets				
Tangible Assets		166386		137186
Investments		220748		176033
		387134		313219
Current Assets				
Stocks	5984		7980	
Debtors	8665		6326	
Cash at Bank and in hand	11608		38519	
	26257		52825	
Creditors: amounts falling due within one year	2625		2809	
Net current assets		23632		50016
Net assets		410766		363235
Funds				
Endowment Funds – Hering Fund		27393		21181
Restricted Funds				
Housing Fund	213929		191299	
Special Publications Fund	76666		69200	
Dinton Pastures Fund	3878	294473	–	263499
Unrestricted Funds:				
Maitland Emmet BENHS Research Fund	56444		46884	
General Fund	34681	88900	31671	78555
		410766		363235

Tangible fixed assets	*Leasehold Fixtures*	*Property & Equipment*	*Total*
Cost	£	£	£
At 1 January 2010	154736	72444	227180
Additions	34000	–	34000
Disposals	–	–	–
At 31 December 2010	188736	72444	261180

Depreciation			
At 1 January 2010	37570	52424	89994
Charge for year	2575	2225	4800
On disposals	–	–	–
At 31 December 2010	40145	54649	94794
Net book values			
At 31 December 2010	148591	17795	166386
At 31 December 2009	117166	20020	137186

Investments	2010		2009	
	M.V.	Cost	M.V.	Cost
Shell T & T	18031	1250	6342	1250
Unilever	21726	248	8587	248
M & G Charifund	72175	20238	67248	20238
Hendersons Bond	58950	58000	54207	58000
Architas Bond	49866	38500	39649	56000
	220748	118236	176033	135736

Unrealised gains arising in the year are shown in the Statement of Financial Activities.

Funds

Analysis of net assets between funds	*Tangible Fixed Assets*	*Invest-ments*	*Net Current Assets*	*Total*
Endowment Funds:				
Hering Fund	–	27394	–	27394
Restricted Funds:				
Housing Fund	148591	63113	–	211704
Special Publications	–	60940	15726	76666
Dinton Pastures Fund			3878	3878
Unrestricted Funds:				
Maitland Emmet BENHS Research Fund	–	56443	–	56443
General Fund	17795	12858	4028	34681
	166386	220748	26614	410766

These abbreviated accounts are extracted from the Trustees' Report and accounts, a full copy of which has been lodged at Dinton Pastures and is available to members upon application to the treasurer.

JOHN FLYNN

EDITOR'S REPORT

Volume 23 of the *British Journal of Entomology & Natural History* was published in four parts in March, June, September and December 2010. The December issue was published at the end of the month due to lack of sufficient material and so not circulated to members until January 2011. Volume length at 280 pages, equivalent to 70 pages per Part, remained above the ten year average.

There were 24 papers and 17 Short Communications about insects in Volume 23 in addition to the usual reports of the Annual Exhibition and Officers' summaries. Thirteen field meeting reports were received and these were published in the first two Parts of the year. Sadly, this number represents a small proportion of the field meetings arranged by the Society during the previous year and if it had not been for the stalwart efforts of Roy McCormick reporting on his Devon Moth Group meetings there would have been very little to publish. It should be noted that the majority of these meetings were moth-orientated and the editor would welcome reports of field meetings where other insect groups are covered to correct the balance.

The majority of published articles were on Hemiptera (43%) with only two on Lepidoptera, three on Coleoptera and four on Diptera. This surprisingly small

number of articles on major groups probably reflects the influence of specialist journals and newsletters and the modern desire to report discoveries on the internet rather than a change in members' groups of interest. Nevertheless I am confident the Society's *Journal* will continue to play an important role in publishing interesting articles on British and European entomology and as a place for members to report their observations.

The most important taxonomic paper was a key to the ant-like flower beetles (Anthicidae) of the UK, Ireland and Channel Isles by Dmitry Telnov. This included 20 figures and four colour plates of the most important species and is a definitive key to this small family of beetles. Council agreed that this should be made available as a separate for sale by the Society and 100 extra offprints were printed. It is pleasing to know that a substantial number of these has already been sold. Another important paper was the Presidential Address of Brian Elliott on the subject of 'Successful techniques for rearing the smaller Microlepidoptera'. It is nice to see that Presidential Addresses are once again being published in the *Journal*. The Society was also delighted to publish 'Invertebrate Translocations – A Code of Conservation Practice' on behalf of Invertebrate Link.

The reports of the Annual Exhibition are traditionally published in Part 3 of the *Journal* so that the issue reaches members just at the right time to remind them to prepare exhibits for the forthcoming exhibition in November. Dr Joe Botting once again kindly agreed to take the photographs of exhibits on the day and to digitally prepare the plates. This year the plates included photographs of Hemiptera, Diptera and Coleoptera in addition to specimens of macro- and micromoths.

There were 12 book reviews and three obituaries, of Revd Anthony Harbottle, Michael Shaffer and Geoffrey Burton, all kindly written by members of the Society.

A new venture has been the provision of an Insect Conservation News section written by Buglife. The idea is been to produce brief reports on some of the latest news and developments in the field of insect conservation, focussing mainly on the UK. So far, there have been two reports, both prepared by Craig Macadam, covering topics as diverse as new EU targets for biodiversity, captive rearing of the RDB scarlet malachite beetle, building artificial rot holes to enhance numbers of the golden hoverfly *Callicera spinolae*, the occurrence of alien killer shrimps in Cambridgeshire and the discovery of new sites for Dainty damselfly and Sussex Emerald in England.

Once again, I would like to thank David Young and Roger Hawkins for preparing the Index to Volume 22 (2009), Adrian Knowles for acting as proof reader and Andrew Halstead for the arduous task of posting the journal and numerous inserts to members four times a year.

I look forward to receiving more papers from members in 2011.

JOHN BADMIN

CURATOR'S REPORT

As reported last year, bids had been invited from members for the recently vacated 40 drawer cabinet that had housed Colonel Emmet's Microlepidoptera collection. It had been proposed that the identity of the highest bidder would be revealed at the 2010 AGM. Perhaps surprisingly only two bids were received and these were opened at the AGM, when it was found that there was a large disparity between them in the amount offered. As it was considered that the higher bid substantially exceeded the value of the cabinet, which the bidder had also not had the opportunity to view, it

was subsequently decided by the Society's Council that he should be offered the cabinet at a price nearer its value and it was sold for £1500.

The removal of this cabinet from the building enabled relocation of the duplicate Lepidoptera cabinet and other minor reorganisation of the layout in the collection room. It was then possible to bring into use a table that had been used for storage so that there are now eight work tables in addition to the curator's desk in the collection room and a little more room for movement.

Ian Sims continued with and has nearly completed the staging of Tortricidae and Pyralidae from the remaining 12 drawer cabinet of the Messenger collection, at the same time clearing this cabinet, which will become available for sale to members during 2011. Ian's work will assist with completion of the layout that was begun in 2007 of the Society's Microlepidoptera into a single collection. It has previously been reported that this had been completed as far as the Scythrididae. Only the Pterophoridae were laid out in 2010 but it should soon be possible to make progress and complete the layout including the tortricids and pyralids. I thank Ian for his contribution towards achieving this end.

As mentioned in previous years there are still a large number of unnamed micro-moths, mostly in store boxes and identified to family level. Further assistance with these by specialists would be appreciated. In the absence of volunteers to carry out the large task of repinning and labelling the Coleoptera and Hemiptera collections as set out in the report for 2008, further consideration is still being given to sources of funding for this project but the best way forward for this has yet to be decided.

I am grateful to Darren Mann for donating a metal cabinet for housing microscope slides, which are presently stored in slide boxes. The great majority of these are genitalia slides of Microlepidoptera from Eric Bradford's collection. The cataloguing of these was begun some years ago by David Gibbs and ideally that should be completed before any movement of slides takes place. Curiously the slides do not appear to relate to pinned specimens in the Bradford collection.

Darren also kindly arranged for all store boxes containing insects to be taken to Oxford for freezing to eliminate any residual pests that might be present and these boxes have since been returned, sealed in polythene bags to limit subsequent access of infestation.

Several members have again donated valuable material to fill gaps in the collection and I am grateful to them for their continuing interest in building the collections. I particularly thank Ivan Perry for significant donations of Diptera, especially Tachinidae.

PETER CHANDLER

LIBRARIAN'S REPORT

This year I have had to scale back my plans for book restoration and journal binding, owing to the current financial situation our country finds itself in. Unfortunately, societies such as ours are not immune from such events. However, I have had the following titles bound to date: *Atropos*, *The Coleopterist*, *Entomofauna*, *Canadian Entomologist*, *Irish Naturalists Journal* and *Entomologists Monthly Magazine*.

There remain a number of books and journal volumes in need of restoration work, and other journals for binding but I have had to put this project on hold until finances permit. On a happier note, I can report that a list of new acquisitions was approved at a meeting of the Library Committee, and I am in the process of purchasing these items at present. At this meeting it was agreed that the content of

several of the journals we receive had changed over the years and that they were now of little interest to members. Consequently, I have cancelled them from 2011. The titles concerned are: *Stuttgarter Beiträge zur Naturkunde* Series B (palaeontology), *Insect Systematics and Evolution* (expensive), *Annalen des Naturhistorischen Museums in Wien*, Series A (palaeontology) and C.

I can also report that we have agreed a journal exchange with the British Arachnological Society, receiving their *Bulletin* in exchange for our *Journal.*

As is customary at this point, I would now like to thank those who have assisted me in my duties during the year, or donated items to the Library. Martin Albertini has lent valuable assistance in the cataloguing of donations and new acquisitions. Between us we have added around 500 titles to the data base this year. Donations of books were made by Peter Chandler and Darren Mann, of whom I am very grateful.

Ian Sims

British Myriapod & Isopod Group (BMIG) Report

The annual BMIG field meeting and AGM was based at St Deiniol's Library at Hawarden in Flintshire during an unusually warm and sunny spell in early April. Visits to the Erddig estate, Marford quarry, Eyarth Rocks and other limestone areas and the Dee Estuary produced a few surprises (including the millipede *Leptoiulus belgicus* at two sites) and some useful gap-filling records during a very congenial weekend.

Volume 24 of the *Bulletin of the British Myriapod & Isopod Group* was published in April 2010, containing a characteristically eclectic mixture of papers on all three groups (centipedes, millipedes and woodlice) and the land amphipod *Arcitalitrus.* Volume 24 also caught-up on, or updated several field meeting reports: from Shropshire and Oban in 2007, Wisley in 2008 and Cornwall in 2009. The *Bulletin* is a bargain with over 80 A4 pages for £5 including UK postage. Material is being collated for publication of Volume 25 in 2011. Paul Lee continues to edit the spring and autumn newsletters, keeping members informed of news, and publicizing events. The newsletter goes out to some 250 members, many of whom are overseas.

Two new initiatives have made progress during 2010. The Biological Records Centre at CEH has been working with Glyn Collis (BMIG website manager) to redevelop the BMIG website, which is due to be re-launched in Spring 2011, hosted by BRC. At its April meeting the BMIG Committee agreed to bid for an OPAL grant, led by Paul Richards, to produce identification aids on CD-rom. This bid was successful and work on the CDs is ongoing.

Tony Barber is still busy collating data for his forthcoming Centipede "atlas" which will provide, for the first time, a wealth of data on the ranges and habitats of species. Further work on several rare (BAP) species of millipede and centipede has been undertaken or is being planned for 2011.

Paul Harding

Dipterists' Forum Report

Dipterists Forum continues to thrive and expand its influence. Its core activities are residential field meetings, an annual talk-centred indoor meeting, workshops for beginners and experienced dipterists, and twice-yearly publication of its Bulletin and journal, *Dipterists Digest*. We can report success in all these areas.

The now-traditional training workshops at the Field Studies Council's Preston Montford centre held 5–7 March 2010 were well attended, ably taught by Forum members. John and Barbara Ismay ran 'An Introduction to Fly Families', and Steven Falk and Mike Bloxham ran an advanced workshop on muscid flies.

Workshops on hoverflies run under the Forum's banner were given by Stuart Ball and Roger Morris at several locations in Britain. To improve these courses, the Forum successfully applied for an OPAL grant to buy a microscope, camera and accessories that allow the image of specimens under the microscope to be projected onto a screen. These became the Forum's first capital possessions.

Four field meetings were held in 2010. The spring meeting was at Windsor Great Park on 22–23 May, where 27 people concentrated on Cranbourne Chase and Highstanding Hill. It was encouraging to see several coleopterists and 11 people who had not attended a dipterists' meeting before. The main summer meeting was based at Stackpole Head, Pembrokeshire, on 12–19 June. Thirty entomologists used self-catering facilities at the National Trust's centre, and this worked well. The weather was rather hot and dry, so records of flies were poorer than may have been expected, and notably few craneflies and fungus gnats were recorded. However, alternative interest took the form of a visit to Skomer Island, where seabirds were the main attraction, and the NNR's greater horseshoe bats leaving their roost at dusk. A second short summer meeting which 14 people attended was based as Wells School, Somerset, on 22–25 July. Twelve people joined the autumn meeting which was split between venues on the south and north coasts of the South-West, at Sidmouth (Devon) and Porlock (Somerset), on 9–18 October. Field meetings have a more relaxed character than those in early days of the Forum, partly because a large proportion of attendees are the same people as went on meetings two or three decades before, and who cannot sustain the frenetic pace of those early days.

The annual indoor meeting and AGM was held at Oxford University Museum of Natural History on 28 November, followed the next day by use of the museum's facilities that include the Verrall-Collin collection. The talks were excellent. Steven Falk summarised his surveys of New Forest valley mires, illustrated by his beautiful photographs of the flies. John Ismay introduced the largely ignored chloropids, with accounts of their ecology and systematics. Judy Webb talked about her detailed autecological study of an endangered fly and its ant host. Shorter talks were given by Andrew Grayson, organiser of the Oestridae Study Group which is the Forum's latest formal scheme, and Barbara Ismay who reminisced on the 2010 International Congress of Dipterology held in Costa Rica. The out-going chairman, Stuart Ball, gave a warmly applauded vote of thanks to Alan Stubbs, who, having initiated the Diptera movement in the early 1970s and played a pivotal role in the Dipterists Forum, stood down from the committee. All the officers that are not required to retire after a period in office were re-elected *en bloc*. Martin Drake was elected as the new chairman, Stuart Ball became the new vice chairman, and John Ismay and John Showers were newly elected as ordinary committee members.

The usual two issues of the Bulletin appeared with the attractive new cover and nicely set-out text, reflecting the serious nature of the society. Included with the two issues of the Bulletin were newsletters for seven of the 19 recording schemes or study groups run under the Forum's aegis. Part 1 of Vol 17 of the *Dipterists Digest* was published in 2010 and the second part was due to appear early in 2011. It continued the high standard that we have come to expect; articles covered species new to Britain or Ireland, interesting local records and ecological and taxonomic studies. Its appearance was enhanced by several colour photographs accompanying several articles. A major publication, *A Dipterists Handbook*, was published by the Amateur Entomologists' Society in 2010; the Forum can take credit for contributing many of the authors, marshalled under the expert editorship of Peter Chandler.

The Forum made itself known to the outside world through its web site which has, among other things, a large photo gallery and copies of past Bulletins. Old-fashioned

methods of encouraging interest in flies also worked well: Mick Parker, the membership secretary, organised the Forum's successful stand at the AES exhibition at Kempton Park. As a result of these outlets and the many workshops, membership grew in 2010 from 353 in February to 382 reported at the AGM in November; these include 29 overseas members.

Finances remained sound despite the loss of income from interest on accounts, so no rise in subscription was felt necessary. More traffic went through the Forum's accounts than previously, mainly because all field meeting and some workshop fees no longer pass through organisers' personal accounts.

MARTIN DRAKE

BEES, WASPS & ANTS RECORDING SOCIETY REPORT

2010 was another year of great general interest in the bees, wasps and ants, resulting in an increasing membership for BWARS, standing at a record of 470 by the time of the AGM in September.

The AGM was held on 25–26th September at Cambridge, being well attended. Many thanks go to Lynn Dicks and Bill Foster for organising the event. At the AGM, David Baldock announced his intention of standing down as Treasurer, a very big gap to fill. We are very grateful to David to all he has done for BWARS over the years – he will not escape completely!

Many new members join after using the BWARS web-site. We have just heard that our application for an OPAL grant to update the web-site has been successful. We are hoping the re-vamp will improve the way in which the site informs both members and visitors about our group of insects, as well as helping us distribute the load involved in running this extremely valuable resource. With the new set-up we are hoping to increase the use which can be made of on-line recording for the public target species, such as *Bombus hypnorum* and *Colletes hederae*, as well as continuing to provide, with Hymettus, concise information sheets about various aculeates.

A second important part of the BWARS 'front end' is, of course, the newsletter. This continues to set a high standard, both in the quality of the submissions and in the printed output.

A regular series of workshops, as part of the BENHS Dinton Pastures workshops, is another important feature in gaining and retaining members. We are very grateful to Ian McLean for all his untiring work in organising these on behalf of both Societies.

The BWARS dataset has been moved to a self-funded server system which is already having a marked impact upon our ability to update and correct the data which we hold. During the year we have received several very large electronic datasets, including ones from Michael Archer and Steven Falk. With the new system it is intended that we will be able to make more regular and complete updates to the NBN datasets than has been the case in the past.

Provisional Atlas No. 8 was completed during 2010, leaving just two more sets of aculeates to map. BWARS is currently considering how to bring the entire series up-to-date, not only in relation to the species maps, but also in relation to the species accounts. It is likely that once the current series of atlases is complete, that future revisions will be web-based, as this allows us greater flexibility than printed volumes.

Data from BWARS was used to provide updated maps for a new edition of the Cambridge Naturalists *Bumblebees* Book during 2010. We are always pleased to be able to be of assistance to projects such as this.

MIKE EDWARDS

PRESIDENTIAL ADDRESS

PART 1: REPORT

Darren Mann

Hope Entomological Collections, Oxford University Museum of Natural History, Parks Road, Oxford

As many past Presidents have commented, this is possibly one of the worst parts of being President – standing up and trying to present a concise and hopefully interesting yet brief account of the year.

Having previously served on Council, I had an inkling as to what was expected of the President. I knew I had to chair Council meetings, preside over the Annual Exhibition and Dinner, give a Presidential Address here, and attend Society meetings, pretty straight forward stuff. So when asked, I thought, why not, it's about time I put something back into the Society that has given me much over the past 15 years. However, my year has turned out to be a little different; I have to say that I did not expect to be doing DIY at Dinton Pastures and sourcing the best supplier of black-out blinds and chairs.

The Society is, I think, the best of its kind in the UK, not only offering an accessible library and collection, but also field and indoor meetings on a range of entomological subjects. However, we still dwindle in numbers and the demographics of the Society are biased towards the retirement age. The Society needs to address this, but how? We rely on volunteers to the run the Society, and maybe we need to change this, a fulltime person, an administrator, who would have time to dedicate to publicising us, search for potential funding streams and increase our web presence and outreach.

Another way forward may be through more collaboration with the other societies, holding joint meetings, both indoor and field and working closer on promoting what we do and what we have to offer. Or maybe, as some have suggested, a more drastic approach through an amalgamation of the smaller societies, creating one large 'super organism'. Ideas and offers of help with pushing the Society forward from the membership will always be welcome.

This last year has seen some major developments for the Society at Dinton Pastures. Firstly, a new and much needed air conditioning unit has been installed, although costly, this new system will help ensure both the long term safety of the Society's collections and libraries, but also the comfort of those visiting.

Secondly, and more significantly, was the purchase of the lease from Wokingham District Council of the last third of the Pelham Clinton building. I would like to thank Graham Howarth for his generous donation which has aided the Society with this purchase and would also like to thank those members who responded to our request for donations. This new room will provide the Society with much needed expansion space for meetings, workshops and some extra storage for the library. Although the room is already fit for use, with the minor works of hole filling, painting and blind installation finished, we have more to do, and hope that by early summer all will be completed. We did in fact host our first meeting in February, where 42 Coleopterists turned up for our 36 chairs, an under estimation on our part as to the popularity of this new venue. I would like to make a special vote of thanks to those members who have helped with project, but in particular to Martin Albertini who has put in many, many more hours than most.

The new format and location of the annual dinner caused some minor debate, with several members airing their disapproval. However, on the day, it went extremely well, the food was good and an enjoyable time was had by all. I would like to thank Mike Simmons for making both the Annual Exhibition and Dinner run as smoothly as they did.

I would like to thank all members of Council for their work, these people give up much time on our behalf and without whom the Society would not function. I would urge others to put their names forward to stand on Council. We need new people with fresh ideas and hopefully some free time to help organise events, or maybe even do a little DIY?

The workshop programme has gone from strength to strength, and I would like to thank Ian McLean for his continued service and organisational skills in putting together such an interesting set of workshops and indoor meetings.

Now, the duty which no President likes to report, the passing of members.

Malcolm Simpson died in December of last year. He was known to many of us for his quirky interest in entomological ephemera. I had the pleasure of knowing Malcolm, and found a kindred spirit who, unlike most of my entomological friends, was happy to talk about the history of pins.

Andy Callow died earlier this year. He was a professional photographer by trade, with a particular fondness for taking pictures of invertebrates. A regular attendee of indoor meetings, especially those relating to photography and has presented the Society with numerous slides for our use.

Dr Don McNamara was a long standing member of this Society and of the Amateur Entomologists' Society. He bred many species of British and exotic Lepidoptera and passed on his knowledge through various livestock groups. He published extensively in the AES Bulletin (often as poet) and served on the AES Council and Conservation Committee.

Rafe Eley died at the beginning of the year. He was an expert lepidopterist with a vast knowledge of the moths of Suffolk and Norfolk, rarely travelling far from his native village of Nowton, near Bury St Edmunds. He kept an eye on the local population of Barberry Carpet and assisted in the breeding of this species for conservation purposes.

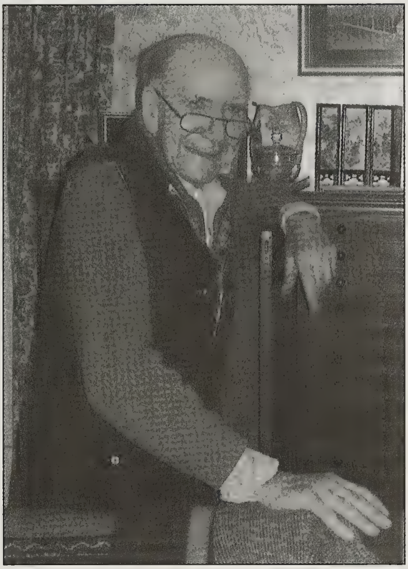
I now invite you to stand for a minute in their memory.

Thanks all round – goodbye.

Ento '11, Chemical Ecology: Reception, Detection and Deception

The Royal Entomological Society's International Symposium and National Meeting will be held at the University of Greenwich, 7–9 September 2011. The meeting will consist of three plenary sessions running in the morning each day which make up the International Symposium on Chemical Ecology, followed by three or four parallel themed sessions in the afternoon which make up the National Meeting. Oral presentations will be allocated a 20 minute slot, with a maximum of 15 minutes for presentation, followed by 5 minutes for questions. If you wish to be added to the conference email list please contact the convenor Professor David Hall (*ento11@gre.ac.uk*) or use the RES dedicated website.

OBITUARY



RAFE ELEY
1924–2010

Rafe Eley was born on 17 January 1924 at Nowton, a small village on the outskirts of Bury St Edmunds. He was to live and work in Nowton for the remainder of his life. In fact, apart from his war service and various trips throughout the British Isles, he seldom spent any time away from Nowton. He was educated at Nowton Village School, leaving at the age of 14 years without any formal qualifications. He began work as a gardener at Nowton Court and remained as a gardener throughout his working life. It was whilst at school that he developed his love for natural history and spent all of his free time searching the surrounding countryside for butterflies and birds' nests. He said that his butterfly net was like a third arm. He was to meet and court his future wife, Joyce, in the Nowton area. They spent most of their courting with his butterfly net looking for various insects. In 1941 he volunteered for war service and joined the Royal Air Force and was to spend his service life flying in Lancaster bombers as a Sergeant Bomb Aimer. He ended his war service as a Warrant Officer with 550 Squadron Grimsby. He was very reticent about his service and while he was proud of the sacrifice made by fellow servicemen, he felt sad about the waste of young men's lives. In 1946 Rafe was demobbed and resumed his gardening career at Nowton.

Rafe joined the South London Entomological and Natural History Society in 1972 and along with his fellow oldies, passed metamorphosis into the present Society. Rafe belonged to that band of lepidopterists whose diligence in the field over a lifetime earned the respect and admiration of colleagues. Essentially a local worker in the confines of Suffolk and Norfolk but with colleagues to expeditions beyond, Rafe's home patch was the open country south of Bury St Edmunds where Sloe Carpet *Aleucis distinctata* was always his "best" insect (and which remains one of the few locations for it in East Anglia). He was never able to drive himself and was very

dependent upon his wife to enable him to collect, which she always did with fortitude and encouragement, including, as it must, long hours of waiting in the dark while Rafe busied himself at the light trap or sugar patches. His local colleagues also helped to ensure that Rafe might enjoy a wider range of habitat by day and night that proved so encouraging after the loss of Joyce.

His knowledge of moths was locally based and interdependent upon nearby contacts of similar origins and interest. He could always identify the bush or verge or pond where the more local species would be. He watched for many years over the traditional hedgerow that held the Barberry Carpet *Pareulype berberata* until the site was wrecked by fire and he assisted the establishment of domestic stock from that source that was inbred for numerous generations to provide material for local re-establishment as well as for others further distant. Breeding from wild-collected larvae and especially from wild-caught females gave him much pleasure and he was particularly good with geometers and the pugs. He was delighted to beat larvae of *Eupithecia egenaria* (commonly called Pauper pug but more correctly Fletcher's pug) from lime trees planted in the Suffolk part of Thetford forest.

Rafe maintained the register of macro moths of Stanta Military Training Area that lies between Watton and Brandon, a list that grew annually and is now incorporated into the HQ East Conservation records. His encounter with Purple-bordered Gold *Idaea muricata* flying freely at dusk along the course of a disused ditch remains the only record for the Training Area. He ran an mv trap annually in his Nowton garden and recorded a fine list of macros of which one of the most notable was a sole example of Sandhill Rustic *Luperina nickerlii* ssp *demuthii*, a rare instance of this coastal species encountered so far inland and particularly as it was not known at that time from the Suffolk coast. Records of moths made by Rafe over all the years at Nowton and from elsewhere in Suffolk will be stored at Suffolk Biological Records Centre, Ipswich; his major collection has been acquired by a private collector.

Of his collecting trips further afield, that to West Sussex will remain one of the most important and pleasurable. It was here in 1990 that Prof. Colin Smith had newly discovered the presence of Southern Chestnut *Agrochola haematidea* and in the follow years Rafe, Colin and I located wild larvae feeding on *Erica* there. Working the same heath in another season, Rafe netted a fine female Dotted Border Wave *Idaea sylvestris* whose large round abdomen prompted me to say it would deliver a goodly number of eggs to which Rafe responded "This one's goin' on pin!"

Rafe shared the concern of all who witnessed the steady decline of the Brecks habitat and he was active in monitoring the Breck BAP species and he lamented their growing list of losses; the destruction of heathland around Lakenheath most saddened him with its vanishing traditional haunts of *Hadena irregularis*, *Heliophobus reticulata*, *Emmelia trabealis* and *Tyta luctuosa*. The loss of flowering verges of Breck roads due to herbicide spraying was another pain he felt angrily.

As well as attending to the vegetables of large country houses, Rafe maintained his own well-manicured patch. Amongst his greatest love of cultivated blossoms, it was his rock garden that reached perfection delivered by annual re-make and re-plant. His wife Joyce died a few years before him and his daughters were constantly at his side throughout the years at Nowton. When he was finally laid to rest at St Peter's Church, Nowton, on Tuesday 13 May 2010 in a churchyard he had helped to keep neat and tidy all of his life, an Orange Tip flew alongside the hedge as he was buried.

The loss of Rafe Eley followed the much earlier loss of Victor Day of Stoke Ferry and more recently of John Fenn of Hockwold, all stalwarts who loved their counties with abundant wildlife and moths that enriched the lives of themselves and their companions.

Mr Stan Dumican, who knew Rafe for over forty years, has written a tribute to Rafe for the Suffolk Naturalists Society and he has most kindly allowed me to reproduce his own account of Rafe's early years, which I am privileged to present as the opening paragraph of this appreciation, and also the touching detail of his burial.

GERRY HAGGETT

RAFE ELEY
A BRIEF APPRECIATION

When Rafe Eley was laid to his final resting place on 13 May 2010 this marked the end of an era in moth recording in Suffolk as well as the end of a friendship I had had with Rafe for nearly a quarter of a century. Gerry Haggett has prepared a fine obituary for Rafe which well reflects the man I knew, including his character and approach to life, as well as some of the mothing achievements Rafe made alone or with members of this Society and with his devoted wife Joyce. Rafe was one of the last of my grandfather's generation of country moth men in so many ways. He lived all his life in one place, which he knew exceedingly well by walking it both for work and for pleasure, with minimal car travel unless Joyce helped him out. He was part of a small network of other moth men, almost all of whom have now died, and he had an immaculate collection of moths. He recorded his observations carefully in notebooks, but published almost nothing. In person he was hugely welcoming and helpful and keen to share his interest. He was so easy-going and certainly not one for formality or pretence. He generally wore old-style clothes, like a labourer from the 1940s, and apparently he attended all the many weddings in his family in the demob suit issued to him at the end of his military service! Locally he was a well-known naturalist who had given many organised talks to school children and who had also appeared on local television and in local papers. Rafe was someone you visited and consulted and many people came to his door over the years. It was unusual if someone did not drop by for a cup of tea and a chat when I was visiting him. And if you needed to find a particular moth, Rafe knew the nearest place you could find it!

I first met Rafe in 1987 when I started working on the conservation of the Barberry Carpet moth *Pareulype berberata*. At that time Shakers Lane, Bury St Edmunds, with its twin hedges containing Barberry *Berberis vulgaris*, was the only site in Great Britain known to support a population of this endangered moth, and that was just down the road from Rafe's house. He had known the site for many decades, had collected the moth there and had accompanied other moth men visiting to collect it. The site had been supplying collections since its discovery in the 1860s. In researching the moth and its requirements, it was quickly clear that Rafe was the man I most needed to consult. To make a long story short, this led to us undertaking a joint expedition to the lane on 24 May 1988 in which we collected two females, which appeared on the wing at dusk exactly when and where Rafe said they would. We founded a captive population, based on the eggs which one of them laid, which Rafe helped me build up by breeding large quantities at our houses, and then we used this in various experiments to establish additional populations. We also maintained annual monitoring of the Shakers Lane population and surveyed some other barberry sites in Suffolk together, right up until the autumn before Rafe died. During this work Rafe, and Joyce while she was alive, frequently put me up overnight at their house, during which we had a number of sessions discussing the habits and requirements of many other species of moth with which I was involved. As with the Barberry Carpet, the conservation of those species benefitted as a result.

I only know of one paper published by Rafe. It is in the Transactions of the Suffolk Natural History Society Volume 25 (1989), adjacent to a paper of mine on the Barberry Carpet moth in Suffolk, in which Rafe is also acknowledged. Rafe's paper is a summary of some of his more noteworthy captures within easy reach of his home, and some of his beloved occasional mothing holidays in Scotland and elsewhere. It was a great satisfaction that I was able to supply Rafe with details of how to obtain the Cousin German *Protolampra sobrina,* which he had tried for unsuccessfully at least twice previously, and that he obtained some for his collection. I had thus returned similar favours Rafe had done for me.

The accompanying photograph was taken on what turned out to be my last "consultation" with Rafe, on Saturday 5 September, 2009, which as usual was also a very pleasant social call.

Typical of the man, Rafe continued operating the light-trap in his garden right up until the Wednesday preceding the Saturday on which he went into hospital and subsequently died. He had operated the trap there continuously for over half a century, being amongst the first to obtain a Robinson mercury vapour light-trap when they were launched commercially in 1950.

Needless to say, and fittingly, moths featured heavily in the memorial speech given by the vicar at Rafe's funeral service, based on information from Rafe's family and friends. The church was absolutely packed with local people, many of whom had known Rafe for a large part of their lives. Rafe is survived by five children, eight grand-children and his first great grandson was born eleven weeks before Rafe died.

PAUL WARING

ARE BUMBLEBEES ROBBING FLOWERS IN YOUR NEIGHBOURHOOD?

NICHOLAS CHARLTON

School of Biological Sciences, University of Bristol, Woodland Road, Bristol BS8 1UG
Nic.Charlton@bristol.ac.uk

My name is Nic Charlton and I am asking for your help in looking for nectar robbing by bumblebees.

In the UK the buff-tailed bumblebee *Bombus terrestris* (L.) will often bite holes in the wild flower red campion *Silene dioica*. Nectar robbing allows these bees to remove nectar from flowers they would not normally be able to feed from.

This is extremely interesting, because, not only could they be cheating the plant by not pollinating the flowers, but these nectar robbing bees may also take nectar away from long-tongued species, such as the small garden bumblebee *Bombus hortorum* (L.).

Last year, with help from the British Entomological and Natural History Society and the Botanical Society of the British Isles, I asked for people's help in checking for holes in red campion flowers made by bumblebees. This involved following some simple instructions to collect information on red campion flowers and whether they showed signs of robbery.

In total, I received 63 records from 10 regions around the UK from 10 recorders. Of those 63 records, 26 showed some robbery, 10 of which had over 50% of flowers being robbed. In Scotland, there were very low robbery levels, which is interesting because *B. terrestris* is less common in the North of the UK. But these 63 records are not enough, and I need your help to obtain more.

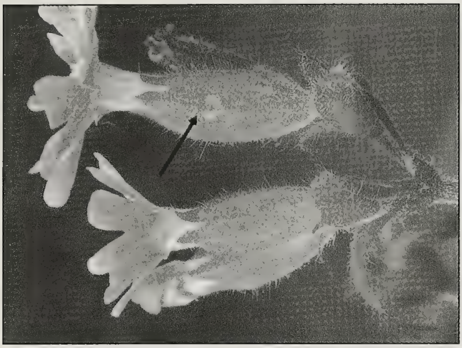


Fig. 1. Arrow points to where a bumblebee has bitten a hole through the calyx of a red campion flower. Photo: N. Charlton.

If you want to help collect records for this project then copy or print out the instructions below, carry out a survey whenever you see some red campion and email me your results. You need to be able to recognise red campion which is easy once you have seen it a few times. The holes you are looking for are small, neat and rounded (see Fig. 1). I even want results that show no nectar robbing so we can see the places where it is not happening.

It would be really great to receive records of robbery from all around the UK, so when you are out and about and you see some red campion stop for a minute and have a look for nectar robbing holes. (It takes less than five minutes per count, but a lot longer to find patches of red campion! – Ed.)

Your records will be part of current research into bumblebees and nectar robbing being carried out at the University of Bristol.

Instructions:

The equipment required is a pen and paper, and it only takes a few minutes to record the data per patch of red campion. Each patch of red campion counts as a single record. You need to be able to recognise red campion and be able to see flowers close up to look for signs of robbery. The main flowering season for red campion is during May and June, but can continue into July.

1. Find a patch of red campion flowers and count the number of open flowers as accurately as you can. Record this as 'number in patch'. For very large or long patches, an estimate to the nearest 50 is sufficient. Ignore small patches of less than 30 flowers.
2. Choose any 30 open flowers, ideally choose flowers that are spread across the patch and check for signs of robbery. Record the number of robbed and unrobbed flowers. e.g. 25 robbed 5 unrobbed. This gives a measure of the level of robbery and zero robbed flowers still counts as a record.
3. From the list below, choose a habitat which best describes where the patch is found, selecting from:
   - Woodland
   - Woodland edge
   - Hedgerow or verge
   - Grassland
   - Other, please describe
4. List any other common flowers close to the red campion. Only open flowers.
5. Please state the location where the patch was recorded, e.g. postcode, grid reference or address, and the date you checked the flowers.

Please email results to *Nic.Charlton@bristol.ac.uk*

Additionally, if you see any bees in the act of robbing, please send details of the species and the location. Photos are also welcome.

FIELD MEETINGS

Oxney Training Area and Oxney Farm, Bordon, Hampshire, 22 August 2009

Leader: **Stephen Miles**. – Local naturalists Andy James and Denise Murray as well as Penny Raynor from the Alton Natural History Society joined Stephen Miles as the only BENHS member, with Bill Wain from the local Whitehill and Bordon Ecological Conservation Group on this very still, but dry, night. Only two participants brought lights that were able to be run on this occasion, one being Bill Wain's mv trap and generator which was placed near to Oxney Farm in a small field adjacent to the deeply banked Oxney Stream at SU790376. The other light-trap was the leaders' battery-fed actinic trap, which was placed in an area of open, short grassland at SU792371 west of the woodland surrounding Oxney Pool. Andy and Denise, who were interested in photographing the moths, commuted between the two locations taking pictures and helping with moth identifications.

The tetrad SU7836 had been the subject area of a previous moth-trapping field meeting held on the 19th July 2008 at nearby Slab Common. The trapping at Oxney yielded 13 common species of moths such as Light Emerald *Campaea margaritata* (L.) and Iron Prominent *Notodonta dromedarius* (L.) that were also trapped at the Slab meeting. Although the two traps used at the Oxney meeting were approximately half a mile apart, of the 30 species observed or trapped on the night, only 10 species were taken in both traps.

Both traps were run for approximately three hours, the trapping period ending just prior to midnight. No nationally Notable or Biodiversity Action Plan species were taken; the most interesting species being the Feathered Gothic *Tholera decimalis* (Poda) and the Antler Moth *Cerapteryx graminalis* (L.) with singletons of each in both traps. Recent comments in the Hampshire and Isle of Wight Butterfly and Moth Report, which is produced annually by the Hampshire & Isle of Wight branch of Butterfly Conservation, have suggested that there has been a decline of both species but especially of the Antler Moth since the 1990s. Although both have turned up since 2008 in my garden trap nearby in Whitehill, Bordon which is adjacent to acid grassland habitats one wonders if moth recorders are not getting out into the field enough, certainly not enough BENHS members are coming to these meetings. Incidentally I also observed a specimen of the Antler Moth visiting ragwort flowers in the daytime at Shortheath Common in summer 2010. Perhaps the conclusion could be that the acid grassland habitats that surround Bordon have not been despoiled yet, as they may have been in the rest of Hampshire.

But with the coming of the disastrous so-called local eco-town here they certainly will be!

The Chairman of the Longmoor Conservation Group, representing Defence Estates is thanked for consent to hold this meeting.

The Warren, Oakhanger and Slab Common, Bordon, Hampshire, 29 May 2010

Leader: **Stephen Miles**. – Sadly this evening was not one of the best, a little drizzle occurred as the moth traps were being set up and there was a cold westerly wind. At about 21.00h, a cuckoo was heard calling from the Slab area and also from other parts of The Warren to the south. The weather clearly affected the attendance as only one other member of the British Entomological & Natural History Society besides

the leader attended. With the threat of more rain and neither of us owning a four-wheel-drive vehicle it was impossible to set our traps anywhere near the more interesting boggy areas where a larva of the Small Chocolate-tip Moth *Clostera pigra* (Hufn.) had been taken in 2009. Thus we were only able to run the traps on the dry heathland and adjacent wooded areas of The Warren. One mv light run by Norman Binsted and one actinic light of the leader's were used, approximately 300 metres apart.

Twenty-two species of moth, including three common heathland micro-moth species were either seen on the sheets or found within the actinic trap. These were all new to the relevant tetrad of SU7634 based on the published records in "Moths of Hampshire and the Isle of Wight" by B. Goater and T. Norriss published in 2001. To see if there have been any changes since this publication date see the distribution maps on the website at *www.hantsmoths.org.uk*. The lights were switched off at about 23.30h when it was clear that trapping conditions were deteriorating. The only notable species was the Orange Footman, *Eilema sororcula* (Hufn.), which is now known to be quite frequent in occurrence in the Bordon area, which was observed on the sheet surrounding the actinic trap. Norman Binsted recorded a single female Poplar Hawkmoth, *Laothoe populi* (L.) that probably emanated from the poplar trees surrounding the nearby satellite tracking facility. He also noted Silver-ground Carpet, *Xanthorhoe montanata* (D. & S.) and Common Swift, *Hepialus lupulinus* (L.). A tawny owl was also heard calling near to the mv trap. All together the actinic trap attracted 17 moth species and the mv light 14 species, however, the mv light attracted five additional species that were not seen inside or in the vicinity of the leader's actinic trap.

The Chairman of the Longmoor Conservation Group, representing Defence Estates is thanked for permission to hold this meeting.

Gallows Bridge Farm and Leaches Farm, Buckinghamshire, 12 June 2010

Leader: **Roger Kemp**. – These two sites of rare lowland flood meadow have recently been acquired by Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT). They are part of the Upper River Ray meadows near Aylesbury in mid-west Bucks. The weather for the meeting was mainly sunny with odd overcast periods. Five people attended the day meeting at both sites and seven the evening meeting at Leaches, the majority of them being BENHS members (the meeting was held jointly with the Bucks Invertebrate Group).

At the morning meeting at Gallows Bridge Farm (SP6620), 13 butterfly species were seen, the most notable being *Aricia agestis* (D. & S.) (Brown Argus) and a single *Cynthia cardui* (L.) (Painted Lady) in a "non-cardui" year. This part of the country has not been significantly affected by the recent parasitic tachinid fly problem of *Sturmia bella* (Meigen), and as expected, *Aglais urticae* (L.) ((Small Tortoiseshell) was amongst the other common butterflies seen. The pyralid *Opsibotys fuscalis* (D. & S.) which has become common in some parts of Buckinghamshire in the last five years was fairly common. As regards other insects (18 moth, three bug, one damselfly, 12 beetle and three bee species) and 16 spider species, there was nothing of particular note. Unusual plants included the rare *Carex vulpina* (True Fox sedge), *Sanguisorba officinalis* (Great Burnet), *Oenanthe fistulosa* (Tubular Water-dropwort), and *Silaum silaus* (Pepper-saxifrage), all indicators of ancient meadows. Curlews are known to breed on this site but the only nest this year was destroyed, presumably by foxes.

At the afternoon meeting at Leaches Farm (SP6419), 11 butterfly species were seen including two sightings of *Satyrium pruni* (L.) (Black Hairstreak), not unexpected, as the site is within its known range and 2010 turned out to be one of its best years ever. Notable amongst the 16 moth species seen was a singleton *Adscita statices* (L.) (Forester), and the micromoth *Adela croesella* (Scopoli).

The evening meeting at this site produced 76 macro and 18 micro moth species from five moth lights despite it becoming quite cool and the grass very wet. The most interesting moth was *Orthonama vittata* (Borkh.) (Oblique Carpet), presumably feeding on the abundant bedstraws in the meadow, which in the last few years has been recorded at a nearby Bucks site, but prior to that only at three sites and almost 50 years ago. Two micro moths which were good for Bucks as there are very few records were *Coleophora striatipennella* Nylander and the tortricid *Cnephasia communana* (H.-S.). A grasshopper warbler provided additional entertainment throughout the evening!

Thanks to fellow recorders and Mick A'Court, the BBOWT warden for facilitating the meeting.

Hatfield Moors, South Yorkshire, 23 June 2010

Leader: **Harry Beaumont.** – The meeting was primarily arranged to search for *Synanthedon scoliaeformis* (Borkh.) (Welsh Clearwing) as it has recently been recorded not too far away in Sherwood Forest, Nottinghamshire. In addition to the leader one other BE&NHS member and nine others (representing the Thorne and Hatfield Moors Conservation Forum, the Sheffield Sorby NHS, Doncaster NHS, Goole & District NHS and Derbyshire and Nottinghamshire Entomological Society) met at the Green Tree Inn at Hatfield Woodhouse at 14.00h from where we drove onto Hatfield Moors. Helen Kirk, secretary of the Thorne and Hatfield Moors Conservation Forum had arranged access to a privately owned area of Hatfield Moors through the kindness of the Buddhist Community of Rangjung Yeshe U.K. Gomde at Lindholme Hall and had also located the stands of old birches on the site. A number of the people attending had come specifically to learn about the utilisation of pheromone lures to attract clearwings. A number of lures were deployed, not only those for the target species but also for other clearwings thought likely to be present. In the event, despite favourable weather conditions and changing locations a number of times, no clearwing moths of any species were seen and the Lepidoptera recorded during the afternoon do not call for comment. Peter Kendall recorded beetles and had hoped to re-find the nationally notable weevil *Sirocalodes mixtus* (Mulsant & Rey) first found on Hatfield Moors in 2008 but that too was not encountered.

Around 18.30h the leader and five remaining participants returned to the Green Tree Inn for an evening meal before returning to the same area of the moor to carry out light trapping. In warm, still conditions two mv lights and an actinic trap were operated by a line of old oaks and by 01.30h had attracted 110 species of moths. The more notable of these were up to ten *Comibaena bajularia* (D. & S.) (Blotched Emerald, a local and infrequently recorded moth in South Yorkshire, *Cyclophora albipunctata* (Hufn.) (Birch Mocha), several *Protodeltote pyrgarga* (Hufn.) (Marbled White-Spot), two *Lygephila pastinum* (Treits.) (Blackneck) and upwards of ten *Cryptoblabes bistriga* (Haw.), a pyralid moth more usually recorded in ones and twos. However the highlight of the evening was a single *Hypomecis roboraria* (D. & S.) (Great Oak Beauty) which provided the first Yorkshire record for 125 years. Despite the failure to find any Welsh Clearwings it proved to be a productive meeting and was much enjoyed by those who attended.

THE MAITLAND EMMET BENHS RESEARCH FUND

In 2001 the family of the late Lt. Col. Maitland Emmet, a distinguished amateur microlepidopterist, made a generous donation to the Society's Research Fund in his memory. As a result the Society has renamed its Research Fund the Maitland Emmet BENHS Research Fund. The Society is very grateful to the Emmet family for their generosity.

The Society invites applications for grants, from the Maitland Emmet Research Fund, to be awarded in January 2012. Awards are open to both members and non-members of the BENHS and will be made to support research on non-marine arthropods, with reference to the British fauna, and with preference given to insects, arachnids, myriapods and isopods. Grants will be given for:

(a) the assistance of fieldwork on non-marine arthropods with relevance to their conservation,

(b) work leading to the production of identification guides and distribution lists, but not the cost of publishing such items.

Travel to examine museum collections and to consult taxonomic specialists would be included. The work and travel is not limited to the British Isles but must have a demonstrable relevance to the British arthropod fauna. Individual grants are unlikely to exceed £500.

Preference will be given to work with a clear final objective (e.g., leading to publication or the production of a habitat management plan). Work on leaf miners and gall forming insects should be submitted to the Society's Professor Hering Memorial Research Fund.

Applicants should send seven copies, if possible, of their plan of work, the precise objectives, the amount for which an award is requested and a brief statement outlining their experience in this area of work, to **Dr J. Muggleton, 17 Chantry Road, Wilton, Salisbury, Wiltshire SP2 0LT**, as soon as possible and not later than 31 December 2011. Further information may be obtained from the same address (email: jmuggleton@aol.com).

THE PROFESSOR HERING MEMORIAL RESEARCH FUND

The British Entomological & Natural History Society announces that awards may be made from this Fund for the promotion of entomological research with particular emphasis on:

(a) leaf-miners

(b) Diptera, particularly Tephritidae and Agromyzidae

(c) Lepidoptera, particularly Microlepidoptera

(d) general entomology

in the above order of preference having regard to the suitability of applicants and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary for fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £1000 in the year 2012.

Applicants should preferably email, or send six copies, of a statement of their qualifications, of their plan of work, and of the precise objectives and amount for which an award is sought, to **Dr J. Muggleton, 17 Chantry Road, Wilton, Salisbury, Wiltshire SP2 0LT** (email: jmuggleton@aol.com). The closing date for projects in 2012 is 31 December, 2011.

BRITISH JOURNAL OF ENTOMOLOGY AND NATURAL HISTORY

VOLUME 24, PART 2, MAY 2011

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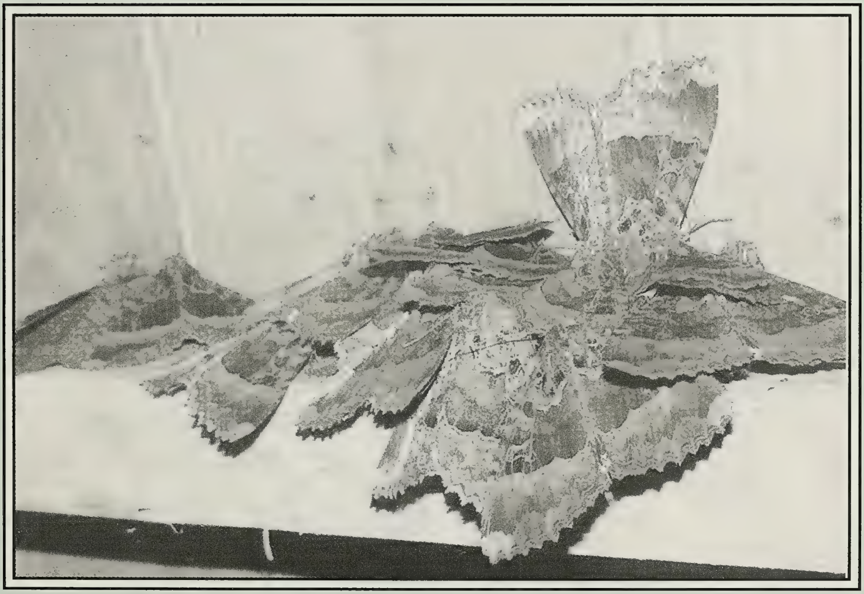

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Registered charity number: 213149

The Society arranges a programme of talks on Saturdays at various locations in Great Britain and a joint evening lecture with the LNHS in London in September. In addition, workshop meetings are held at the Society's headquarters and the well-known ANNUAL EXHIBITION takes place in the autumn. The 2011 Exhibition is planned for Saturday 5 November at Imperial College, London SW7. Frequent Field Meetings are held at weekends in the summer. Visitors are welcome at all meetings. The current Programme Card can be obtained on application to the Secretary, J. Muggleton, at the address given below.

The Society maintains a library and invertebrate collections at its headquarters in Dinton Pastures, which are open to members on various advertised days each month. The Society's web site, http://www.benhs.org.uk, has the latest news.

Applications for membership to the Membership Secretary: D. Young, 22 Wordsworth Close, Saxmundham, Suffolk IP17 1WF. Tel: 01728 603568.

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Society Website: www.benhs.org.uk for recent information on the Society's meetings programme and general society details.

Cover photograph: The Old Lady moth *Mormo maura*, Banstead, Surrey, 15.viii.2011. Photo: John Shepley.

NOTE: The Editor invites submission of photographs for reproduction on the front covers of the journal. The subject matter is open, with an emphasis on aesthetic value rather than scientific novelty. Submissions should be in the form of colour or black and white digital images (jpg or tiff format) with a minimum resolution of 1275 pixels (i.e. 4.25 inches @ 300dpi).

TWO NEW SPECIES OF AGROMYZIDAE (DIPTERA) MINING THE LEAVES OF *ANTENNARIA DIOICA* IN THE SCOTTISH HIGHLANDS AND NORTHERN IRELAND

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Abstract

***Phytomyza antennariae* sp.nov.** and ***Phytomyza heckfordi* sp.nov.**, reared from larvae mining the leaves of *Antennaria dioica* L. (Gaertner) (Asteraceae) in the Scottish Highlands are described and their genitalia illustrated. Leaf-mines of *P. antennariae* are also recorded from Northern Ireland but flies were not reared.

Introduction

Bland (1999) on the basis of a leaf-mine in Mountain Everlasting *Antennaria dioica* L. (Gaertner) which contained an exuviae claimed the occurrence of *Ophiomyia gnaphalii* Hering in Scotland. The characteristics of the leaf-mine closely matched those of *O. gnaphalii* as described by Spencer (1990). Further material has now become available which shows that the Perthshire mine and exuviae were not those of an *Ophiomyia* species but an undescribed species of *Phytomyza*. An additional undescribed species of *Phytomyza* was discovered during the study.

Species descriptions

Phytomyza antennariae n.sp.

Named after the larval foodplant *Antennaria dioica*.

Description of imago:

Head: Frons 1½ times width of eye, not projecting above eye in profile; 2 equal upper orbital bristles (ors) sloping outwardly and upwards; a single incurved lower orbital bristle (ori), the ventral one absent; orbital setulae proclinate and rather long; jowls just over half height of eye; third antennal segment as long as broad and covered with long hair; arista slender and normal.

Thorax: Mesonotum with 3 + 1 strong dorso-central bristles (dc); acrostichals (acr) sparse and in 2 regular rows; wings very pale ochreous, length 2.7–3.0 mm, second costal section 2-2½ times length of fourth, costa extending only to R4 + 5; second cross-vein absent.

Aedeagus: see Figs.1A and 1B.

Colour: Frons creamy yellow; hind margin of eye briefly blackish dorsally, only outer vertical seta (vt) on dark ground; orbits, jowls and face all yellow; antennal segments all yellowish brown, sometimes quite yellow. Mesonotum matt grey to grey-brown; scutellum concolorous but tending towards yellowish along mid-line; sides of thorax of similar colour to mesonotum, but with interstices yellow, as are anterior dorsal corner of mesopleuron and a vague patch in notopleural area; legs brown with all knees yellow; squamae cream, margin and fringe blackish; halteres yellow. Abdomen brown to blackish with lateral edges paler, especially sternite of first segment; posterior edge of sixth abdominal tergite finely margined yellow.

A B

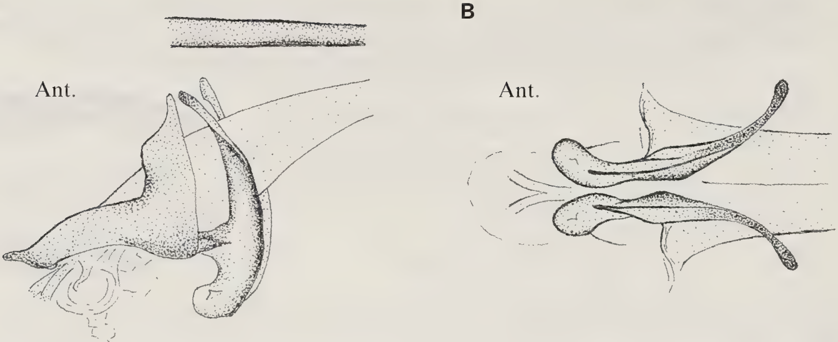

Figure 1. A, Lateral view of aedeagus of *Phytomyza antennariae* (holotype). B, Postero-ventral view of distiphallus of *Phytomyza antennariae* (paratype).

In Spencer's keys to the Agromyzidae of Britain (1972) and Fennoscandia (1976), *P. antennariae* runs to *P. cirsii* Hendel in the former but has both upper orbital bristles (ors) equal, and to *P. rufescens* Roser in the latter, but has the hind margin of the eye partially darkened. It clearly differs from both species in the form of the genitalia.

Description of puparium:
Length 1.3 to 1.4mm; elongate ovoid, narrowing slightly caudally; pale yellowish cream; segmental divisions distinct as shallow rounded grooves. Anterior spiracles are on two short projections separated by one to two times their height. Posterior spiracles are on two short projections with 8–9 spiracular openings on each (see illustration in Bland (1999)) and separated by 4 to 5 times their height.

Biology:
The egg is laid at the base of one of the outer mature leaves of *A. dioica*; plants growing amongst heather (*Calluna vulgaris*) are particularly favoured. The larva mines just below the upper epidermis of the leaf, consuming the most superficial layer of chlorophyll-containing tissue. The freed epidermis often contracts slightly, causing the outer edges of the leaf to curve inwards and so making the mine rather inconspicuous. In each leaf the larva makes several broad straight galleries from the leaf base to varying distances up the leaf, they fuse at the base and so form a palmate blotch-mine. The mine has been illustrated previously (Bland, 1999). The larva moves from leaf to leaf via the leaf bases and may mine up to ten leaves (mean 6, n = 8). Pupation occurs within the mine usually near the base of the last leaf mined which is invariably one of the small central leaves of the rosette.

Eggs are presumably laid in July–August. The time of hatching and commencement of larval feeding is unknown and probably varies according to the conditions. Leafmines containing larvae have been found in May and as late as 19 June, although mines with unemerged puparia may occur as early as 3 June and through to 28 June. Fly emergence in collected material has been recorded between 17 June and 7 July inclusive. Only exuviae were found in mines collected after 30 August. The species is thus univoltine.

Material studied: Mines of this species were collected from the following sites;
SOUTH ABERDEENSHIRE (VC.92): O. S. Grid NO0592 Lundain Burn, Glen Lui

on 28.vi.2001 (1♂ **holotype** reared), 21.vi.2003, 4.ix.2004 and 7.vi.2006; O. S. Grid NO0692 Clais Fhearnaig on 3.vi.2001 (2 ♂♂ **paratypes** reared); O. S. Grid NO1289 Coire allt a'Chlair on 15.vi.2000, 13.ix.2000 & 3.ix.2001; O. S. Grid NO1490 Morrone Birkwood on 13.ix.2000, 9.viii.2001, 3.ix.2001 and 19.vi.2002 (3♀♀ **paratypes** reared); O. S. Grid NO1494 Gleann an t-Slugain on 16.v.2002, 20.vi.2003 and 25.vii.2004.

EAST PERTHSHIRE (VC.89): O. S. Grid NN8971 W. of Marble Lodge, Glen Tilt on 6.ix.2001; O. S. Grid NO0076 Gleann Mór, Fealar on 25.ix.1997 (Bland, 1999); O. S. Grid NO1278 S.E. of Loch Vrotachan (at 830m a.s.l.) on 31.viii.2010 and 9.iv.2011.

CO. FERMANAGH (VC.H33): Gortgor on 19 & 20.vi.2004; Monawilkin on 19.vi.2004.

Initially it appeared that this species was restricted to the southern part of the eastern Highlands of Scotland, but its discovery in Co. Fermanagh in Northern Ireland suggests that it may be quite widespread. No specimens have yet been reared from Ireland.

Relationship to other species

The form of the leafmine is very similar to that of *O. gnaphalii* as also is the structure of the posterior spiracles of the puparium. This led to the erroneous conclusion that it was that species in spite of the difference in number of spiracular openings. Comparison of the male genitalia of the present species with those illustrated for *O. gnaphalii* by Spencer (1972, Fig. 52; 1990, Fig. 1026) show them to be different but with some strong similarities, suggesting either a close affinity or convergent development. However the head profiles for both sexes of *O. gnaphalii* illustrated by Spencer (1972) differ markedly from those of *P. antennariae* – males of *antennariae*, like the female, do not have vibrissal fasciculi. The present species clearly belongs to the Phytomyzinae on the basis of forewing subcostal development but has a weak facial keel separating the antennae as in *Ophiomyia*. On the basis of genitalic structure *P. antennariae* does not appear to be closely related to any *Phytomyza* species.

In many of the localities where *P. antennariae* is present, there is a second species of agromyzid present mining the leaves of *Antennaria dioica* and forming a linear-blotch mine restricted to a single leaf. This also appears to be undescribed.

Phytomyza heckfordi n.sp.

Named after Bob Heckford of Devon who discovered this species.

Description of imago:

Head: Frons equal to width of eye and not projecting above eyes in profile; single upper orbital bristle (ors) directed straight upwards; 2 incurved lower orbital bristles (ori), the lower one weakest; orbital setulae proclinate; jowls just less than half height of eye; third antennal segment as long as broad and quite pilose; arista slender and normal.

Thorax: Mesonotum with 3 + 1 dorso-central bristles (dc), the front one being the weakest; acrostichals in 3 to 4 irregular rows; wings pale brown, length 2.5mm, second costal section only twice length of fourth, costa extending only to R4 + 5; second cross-vein absent.

Aedeagus: see Fig. 2

Colour: Frons orange-yellow; hind margin of eye very shortly black, both vertical setae (vt) usually on a pale ground; orbits, jowls and face yellow; all antennal

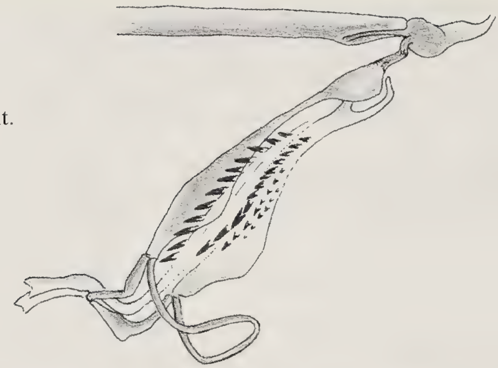

Figure 2. Ventro-lateral view of aedeagus of the holotype of *Phytomyza heckfordi*.

segments brown. Mesonotum slightly shining greyish brown; sides of thorax similar colour, interstices yellow and a slight suggestion of yellowish in notopleural area; legs yellowish brown, femora darker, but front legs with clear yellow knees; squamae white, fringes slightly brownish; halteres yellow. Abdomen brown with lateral edge of first segment yellowish.

In Spencer's keys to the Agromyzidae of Britain (1972) this species fails at couplet 36 which requires the length of the second costal section of the forewing to be 3 times, or more, that of the fourth section. However in Spencer (1976), *P. heckfordi* runs smoothly to couplet 44 which separates *Phytomyza arnicicola* Lundquist from *Phytomyza arnica* Hering on the basis of the ratio of the length of the second costal section of the forewing to the fourth costal section (*P. arnicicola* $2^1/_4-2^2/_3$: 1, *P. arnica* $3–3^1/_2$: 1). *Phytomyza heckfordi* is closely related to the two species on *Arnica* but differs in the forewing ratio being only 2 : 1, the body being more brownish, and small, but significant, differences in the male genitalia.

Description of puparium:
Length 0.9 to 1.0mm; parallel-sided and rounded at both ends; pale orange-brown, darker near to hatching; segmental divisions distinct as shallow rounded grooves. Anterior spiracles on two T-shaped horns projecting from a common base. Posterior spiracles on two short stout conical horns, with adjacent bases, at right-angles to the puparium surface, and capped by an overlapping apical disc with 13–14 spiracular openings.

Biology:
The egg is usually laid at the edge of the leaf in the upper half. The mine starts as a narrow linear gallery around the edge of the leaf for about 15mm, then forms a brown blotch (Fig. 3) that occasionally occupies the full width of the leaf; the frass in the blotch is in scattered black granules of variable sizes. The species is bivoltine. Occupied leafmines have been found in late June (28th). The larvae left the mines to pupate and these puparia produced flies between 23 July and 1 August inclusive. Further occupied mines have been found between 3 and 13 September inclusive. Of the four puparia successfully reared from this second generation, two produced flies before late October the same year while two emerged in late April (27th & 29th) the following year. All were kept in a cool place indoors. Aborted mines were more

Figure 3. A leaf-mine of *Phytomyza heckfordi* n.sp. in *Antennaria dioica.*

frequently found than non-aborted ones so it may be that part of the population of this species has the potential to be continually brooded if the weather conditions are suitable, but frequently they are not.

Material studied: Mines of this species were collected from;
SOUTH ABERDEENSHIRE (VC.92): O. S. Grid NO0592 Lundain Burn, Glen Lui on 28.vi.2001 (1♂, 2♀ **paratypes** reared), 4.ix.2004 & 7.vi.2006; O. S. Grid NO1289 Coire allt a'Chlair on 13.ix.2000 & 3.ix.2001; O.S.Grid NO1487 Glen Clunie on 23.vii.2004 (1♀ **paratype** reared); O. S. Grid NO1490 Morrone Birkwood on 13.ix.2000 (1♀ **paratype** reared), 3.ix.2001 (1♀ **paratype** reared) and 12.ix.2001; O. S. Grid NO1494 Gleann an t-Slugain on 25.vii.2004.
EAST PERTHSHIRE (VC.89): O. S. Grid NN8971 W. of Marble Lodge, Glen Tilt on 6.ix.2001(1♂ **holotype** reared).

Relationship to other species

The leaf-mine of this species is similar to that of *P. kyffhusana* Hering but the ♂ genitalia show that they are clearly different species. *Phytomyza heckfordi* has many cornuti in the aedeagus while *P. kyffhusana* has none – see Spencer, 1990, Fig. 1033). The two species closest to *P. heckfordi* are *P. arnica* and *P. arnicicola* from which it differs by having fewer cornuti in the aedeagus.

Discussion

In mainland Europe two leaf-miners have been reported in *Antennaria dioica*. The earliest report of a leaf-mine in *Antennaria* appeared in a letter from E. M. Hering to J. Klimesch dated 3.xii.1947 (Spencer, 1969) and states that Linnaniemi found an unknown agromyzid mine in *Antennaria* in 1913, which has not since been refound. No details of the mine are given. This is possibly the unknown species of Agromyzidae whose mine is included in Hering's key (1957) and described as initially a narrow linear gallery, enlarging into a whitish green blotch. In March 1959 E. M. Hering informed K. A. Spencer (see Spencer, 1969) that he had now reared *Phytomyza kyffhusana*, originally described from *Inula* and *Gnaphalium* (Hering, 1949), from *Antennaria*. However in 1963 he described it as a new species, *Phytomyza gnaphalii*, in view of a few small differences in the fly and the mine and also associated it with the mine described in his key (Hering, 1957). Spencer (1990) after inspecting the male genitalia of the two species synonymized them under the name *P. kyffhusana*. The distiphallus illustrated by Spencer (1990) for *P. kyllhusana* is quite different from that of *P. heckfordi* described above, even though the mines are quite similar.

Hering (1949) also described *Ophiomyia gnaphalii*, reared from characteristic leaf-mines in *Gnaphalium sylvaticum*. Bühr (1960) subsequently reared it from *Antennaria dioica* from Thuringia, Germany. The mines of this species are very similar to those

of *P. antennariae* described above and the adult flies appear to have similarities in their genitalia.

Many upland flies are circumpolar in their distribution or have close relatives in North America. North America also has two species of Agromyzidae in *Antennaria* but only one may be related to European species. Smulyan (1914) recorded rearing *Phytomyza chrysanthemi* Kowarz from *Antennaria plantaginifolia*. Frost (1924) quoted this record and was emphatic that *P. chrysanthemi* was not the same species as *P. atricornis* Meigen. However in 1959, Frick synonymized *P. chrysanthemi* with *P. atricornis* and said that *P. atricornis* larvae form serpentine mines in the leaves of many plants including *Antennaria plantaginifolia*. Later Spencer & Steyskal (1986) listed two species under *A. plantaginifolia*, namely "*Phytomyza* sp.", presumably a non-commital reference to the species quoted by Smulyan, Frost and Frick, and an "unidentified mine no. 6." The illustration of "mine no. 6" (Spencer & Steyskal, 1986, Fig. 1364) is the same as that illustrated in Spencer (1990) (Fig. 1034) and shows a palmate linear mine similar to that of *P. antennariae* above. The mine is ascribed by Spencer (1990) to 'a *Phytomyza* species, probably belonging to the *robustella*-group' and may prove to be *P. antennariae* or a closely related species.

The holotype and a female paratypes of both species have been deposited in the National Museums of Scotland, Edinburgh.

Acknowledgements

The author is exceedingly grateful to R. J. Heckford, who not only discovered many of the sites but was kind enough to collect much of the material for me; M. R. Young also generously collected some of the leaf-mines. M. von Tschirnhaus kindly assisted with some of the literature and translation.

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THREE SPECIES OF PARASITOID WASP (BRACONIDAE, ALYSIINAE) NEW TO THE BRITISH ISLES

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Abstract

Three species of parasitoid wasp (Hymenoptera, Braconidae, Alysiinae) are added to the British list from material reared from Diptera in Scotland: *Dacnusa nigrella* Griffiths, *Chorebus luzulae* Griffiths and *Alloea lonchopterae* Fischer. *Chorebus crassipes* (Stelfox), previously known from Ireland, is recorded from mainland Britain for the first time.

Introduction

The purpose of this note is to introduce three species of parasitoid wasps to the British list in anticipation of a new Hymenoptera checklist currently in preparation (G. R. Broad *et al*., ed., in prep.). The wasps are part of a large collection of material reared from phytophagous Diptera by KPB chiefly collected in Scotland. They have been identified by HCJG and are currently in his collection which will be deposited in the National Museums of Scotland (Reg. No. NMS2007.008). The species reported here are all known from continental Europe where they have been reared from the same hosts. The first two species are in the tribe Dacnusini, the last in Alysiini. KPB's material includes further species new to the UK, probably undescribed, but these need more research before publication.

As far as is known all Alysiinae are parasitoids of Diptera which nearly always attack the larval stage. The parasitoid larvae feed internally and remain in an early instar until the host pupates (i.e. they are koinobiont endoparasitoids) when they rapidly consume the host and pupate within the host's puparium (Shaw & Huddleston, 1991). The adult parasitoid exits its host's puparium using the flattened and outwardly articulating mandibles that are characteristic of the subfamily.

Species description

Dacnusa nigrella Griffiths 1966 (Fig. 1)

Male reared from *Phytomyza tenella* Meigen (Agromyzidae) in seedheads of *Pedicularis palustris* L. (Orobanchaceae); collected north of Islandadd Bridge, Argyllshire, Scotland (O.S. grid ref. NR8092), on 17.viii.89, emerged 23.vi.90 (collection code: KPB-3669). Male reared from same host and host plant, collected Dunhog Moss, Roxburghshire, Scotland (O.S. grid ref. NT4724), on 21.viii.99, emerged 2000 (collection code: KPB-7469B).

Dacnusa nigrella was originally described from 42 specimens reared from *P. tenella* in Denmark by Schlick. He did not record host plants but almost certainly they were reared from *P. palustris* (see discussion in Griffiths, 1966, p. 821). No records from any other country in Fauna Europaea (van Achterberg, 2004) though almost certainly overlooked.

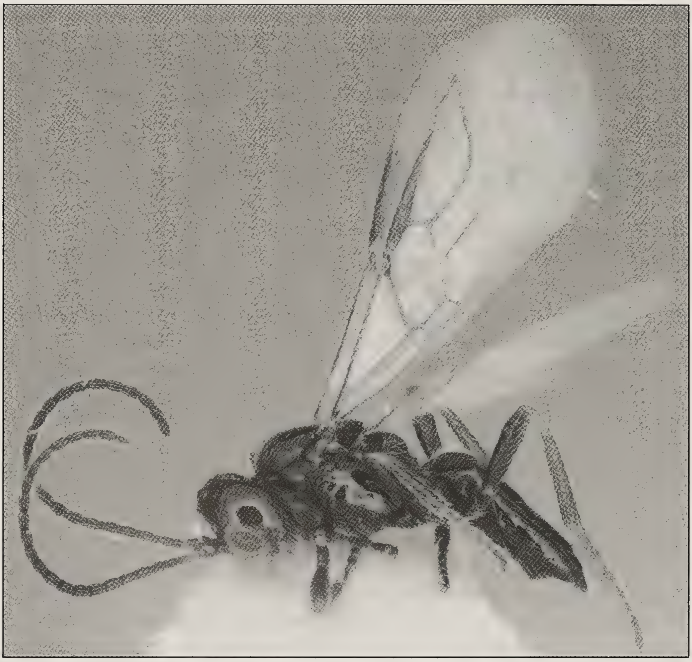

Fig. 1. *Dacnusa nigrella*. Griffiths. Fore wing length 1.8mm.

A distinctive, small, very dark species with almost black legs. Griffiths (1966) compares the species with *D. nigropygmaea* Stelfox whose host is unknown. *Dacnusa nigrella* is darker with a shorter marginal cell which agrees with our specimens. Males of the Danish *D. nigrella* have 24 (one example) or 25–27 antennal segments while *D. nigropygmaea* has 27–29. The two specimens here have 24 and 25 segments.

There has been a radiation of *Phytomyza* in the seeds and stems of Orobanchaceae (in the modern sense of the family including *Orobanche* and the parasitic and semi-parasitic species previously included in Scrophulariaceae) whose parasitoids are still poorly known. KPB has also reared *Phytomyza diversicornis* Hendel from stems of *Pedicularis palustris* and from these two parasitoid species have been reared, a single *Dacnusa* that appears not to be described and *Chorebus crassipes* (Stelfox). The latter is known only from Ireland and Denmark (where bred from the same host, Griffith, 1966) and is recorded here for the first time from mainland Britain (female, ex host collected Adderstonelee Moss, Roxburghshire, Scotland, O.S. grid ref., NT5312, on 2.viii.01, emerged 19.v.02, collection code – KPB-8227). HCJG has reared a long series of a *Chorebus* from an undescribed *Phytomyza* sp. (Bland & Godfray, in review) in seed heads of *Pedicularis sylvatica* L in Western Ireland (and KPB the same host from Scotland) which we believe is also undescribed.

Chorebus luzulae Griffiths 1966 (Fig. 2)

Four males and five females from *Phytomyza* (= *Chromatomyia*) *luzulae* Hering (Agromyzidae) mining the leaves of *Luzula pilosa* (L.) (Juncaceae); collected Birks of Aberfeldy, Perthshire, Scotland (O.S. grid ref. NN8547) on 20.iii.94, emerged

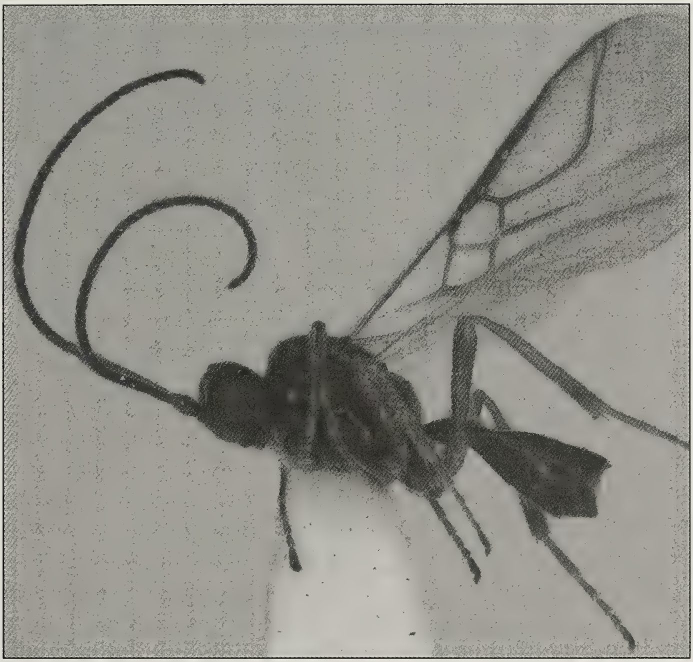

Fig. 2. *Chorebus luzulae*. Griffiths. Fore wing length 2.7mm.

12–16.v.94 (collection code: KPB-5357). Male reared from same host and host plant; Scrogbank Rig, Selkirkshire, Scotland, UK (O.S. grid ref. NT3837) on 9.iii.02, emerged 28.iii.02 (collection code: KPB-8402). *Chromatomyia* species pupate in the mine and have been considered a distinct genus though recent molecular studies show it is not distinct from *Phytomyza* (Scheffer, Winkler & Wiegmann, 2007).

Chorebus luzulae was described from four specimens bred by Groschke from this host on *Luzula* sp. in Germany. Though not listed in Fauna Europaea it has also been bred from *Phytomyza luzulae* in Poland (Michalska, 1973) while Fauna Europaea records its presence in the East Palaearctic (van Achterberg, 2004).

This species belongs to the large *ovalis/lateralis* complex (*sensu* Griffiths) which contains many parasitoids of leaf-mining agromyzids. It is not a very distinctive species (see discussion in Griffiths, 1966, and key to *Chorebus* in Griffiths, 1968) and is closely related to other parasitoids of *Phytomyza* that pupate inside the leaf, in particular *C. aphantus* (Marshall) which attacks species feeding in grass. Our specimen matches well Griffiths' description – in particular it has 33 antennal segments (the same as the male holotype and paratype), and a petiole with weak apical tufts of pubescence.

Alloea lonchopterae Fischer 1966 (Fig. 3)

Female reared from *Lonchoptera lutea* Panzer (Lonchopteridae) pupa in *Quercus* leaf litter; collected Byres Hill, East Lothian, Scotland (O.S. grid ref. NT4976), on 30.iii.02, emerged 25.iv.02 (collection code: KPB-8441).

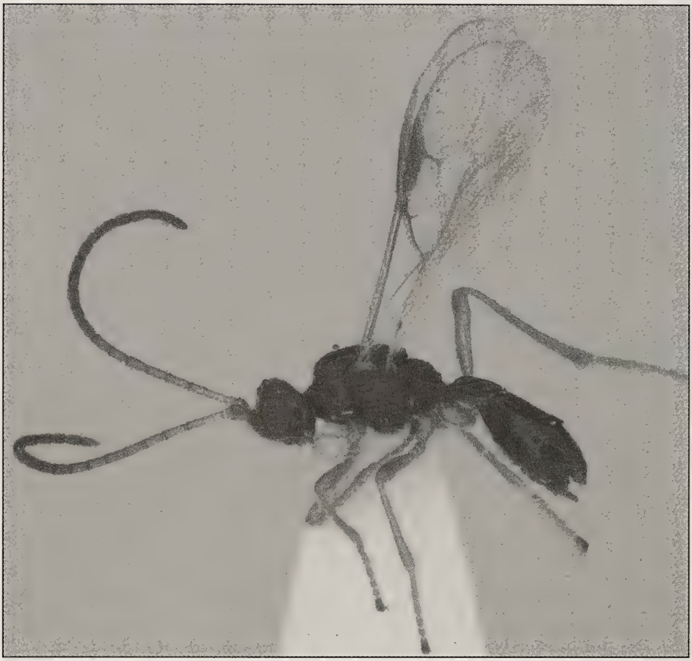

Fig. 3. *Alloea lonchopterae*. Fischer. Fore wing length 2.1mm.

All species in this distinctive genus use Lonchopteridae as hosts (Wharton 1984). Currently *Alloea contracta* Haliday is the only species on the British list, and it was also the only European species until Fischer (1966) described *A. bonessi* Fischer (bred from *Lonchoptera lutea*) and *A. lonchopterae* Fischer (bred from *Lonchoptera* sp.). The number of antennal segments (21), the thickening of segments 5–8, the yellow colouration of segments 3–9, as well as characters of the head and mesonotum all agree with *A. lonchopterae*. There are records in Fauna Europaea from Bulgaria, Germany, Iceland, Holland, Hungary, Russia, Slovakia and the East Palaearctic (van Achterberg, 2004). Note, Fischer's (1966) German key to *Alloea* was translated into Russian (Tobias, 1986) and from there, the strain showing somewhat, into English (Tobias, 1995).

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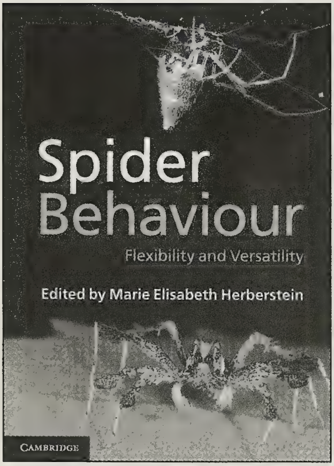

BOOK REVIEW

Spider Behaviour edited by Marie Elisabeth Herberstein. 391pp., (Cambridge University Press, 2011). Paperback £35.00. ISBN: 978-0-521-74927-5.

Insects often form the subject of behavioural studies and a number of scientific journals exist to report their findings. Studies concerning the behaviour of spiders are, however, a relatively rare occurrence. Considering this journal as an example, although understandably biassed towards insects, a glance at the back issues revealed that despite some 18 non-insect Orders being covered, spiders have not made an appearance since volume 20 (2007).

Believing that '. . . the utility of spiders in behavioural research is grossly underestimated', concern by a number of 'spider champions' at the apparent lack of interest in these animals is one driver behind the publication of Spider Behaviour. Presenting their behaviour as being adaptable, rather than a set of mechanistic responses, most areas of behaviour are covered; the aim being to bring the subject of spider behaviour to the attention of the wider research community. In addition to being available in hardback (£75), this aim should be further assisted by the publication of an eBook version, for downloading.

The book itself comprises ten chapters with contributions by fifteen authors, largely from academic institutes in nine different countries. This may ring alarm bells, but the editing has resulted in a cohesive publication with the same readable style throughout, thus avoiding the obvious danger of the book being simply a collection of scientific papers.

References are given, but not obtrusively and readability is maintained. References are given at the end of each chapter, rather than at the end of the book; researchers should find the pre-identification of relevant references in this manner to be a useful, time saving approach.

A number of black and white figures are given, fifteen of which are repeated in colour partway through chapter four, which seems to be an unnecessary duplication. As an alternative, presumably for no additional cost, fifteen additional black and white figures could have been included. That said, the duplication does not detract from the book and although the colour figures appear to be printed on the same paper as the rest of the book, they are of good quality.

Aiming to provide enough background for those unfamiliar with spiders to tackle the rest of the book with some confidence, the book starts with an introductory chapter into spider biology, concentrating on behavioural aspects and includes a brief evolutionary history. The book proceeds with a review of foraging behaviour, concentrating on flexibility in the use of chemoreception, vision and mimicry. Webs, surely the most obvious aspect of spiders, are next covered, with a brief description of the various types of silk and webs followed by a discussion of the influences on variations in their production and construction.

Despite being predators, their small size means that spiders are themselves also vulnerable to predation and they have therefore evolved a number of ways of at least trying to avoid becoming someone else's next meal. The fourth chapter discusses methods of avoiding predators, which include the use of camouflage, mimicry, aposematism and the intriguing behaviour of self-induced limb-loss (autotomy).

Spiders process a wide range and combination of chemical, visual, acoustic and tactile sensory information as they go about their daily lives. The next three chapters devote themselves to this area of behaviour, covering the various communication systems, male-female conspecific recognition, the use of deceptive signals for predation and finally mating. The latter activity presenting particular danger to any males wishing to avoid being eaten by the female.

Despite the majority of spiders being solitary, some species practice group living. Chapter eight covers this area, splitting group living into rarer social species which live together in a cooperative group and the more common colonial species in which individuals share a common resource. Chapter nine reviews the evidence for behavioural flexibility, learning and other cognitive processes. This chapter concludes with a list of research areas identified as being ' . . . particularly ripe for exploration', followed by some advice for potential researchers.

As an illustration of many of the concepts presented throughout the book, the final chapter reviews the subfamily Argyrodinae (Theridiidae).

The main theme of this book is the plasticity of behaviour in spiders, with the suggestion being that spiders are perhaps more adaptable than insects. Being able to learn and adapt your behaviour is only useful if you live long enough to take advantage of such an ability. Short lived organisms would surely not have enough time to be able to attain a wide range of behavioural responses and it may therefore be the case that spiders simply have a larger set of pre-programmed responses than insects. By far the best way to determine just how adaptable spiders are in comparison to insects is of course to undertake your own research. Due to their wide range of behaviours, spiders should make ideal research subjects and those wishing to take the subject forward will find plenty of pointers in this book. Alternatively, those just wishing to learn more about spider behaviour should also find the book useful.

JOLYON ALDERMAN

CHANGES IN DISTRIBUTION AND PEST STATUS OF YEW SCALE *PARTHENOLECANIUM POMERANICUM* (HEMIPTERA: COCCIDAE) IN BRITAIN BETWEEN 1944 AND 2010

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ABSTRACT

The yew scale *Parthenolecanium pomeranicum* (Kawecki) is native to Europe and feeds by sucking sap from the foliage and stems of *Taxus*. It was first detected in Britain at a commercial plant nursery in West Sussex, June 1928, and during the 1930s and 1940s became a damaging pest that was commonly reported to the Royal Horticultural Society by its membership. The distribution of yew scale in Britain was mapped in 1944 which showed that it was restricted to southern England, being most frequently reported from East and West Sussex, and Surrey. Since then it has increased its geographical distribution as far north as North Yorkshire and Lancashire in England, and Flintshire in Wales. The number of reports of it causing damage to yew, however, has decreased. The evidence presented supports the hypothesis that yew scale is not native to Britain but was introduced from continental Europe, probably by the horticultural plant trade during the 1920s.

INTRODUCTION

Scale insects (Hemiptera: Coccoidea) are among the most poorly studied of all insect groups in Britain and the geographical distribution of the majority of species is inadequately known. This is due, at least in part, to the adult females being larviform and consequently they do not resemble typical insects. They are also small with cryptic habits and easily overlooked. One species, however, whose distribution in Britain has been investigated in more detail than most is the yew scale *Parthenolecanium pomeranicum* (Kawecki) (Coccidae) (Plate 9, Figs 1–4). This is because it can be a damaging pest of yew (*Taxus baccata* L., Taxaceae) and is therefore more likely to be noticed and reported by gardeners (or at the least the symptoms are) than most scale insects.

Large infestations of *P. pomeranicum* can cause conspicuous damage as they cover the stems and foliage in excreted honeydew which serves as a medium for the growth of black sooty moulds and attracts ants and flies. Infested plants may exhibit chlorosis and die-back. The Royal Horticultural Society (RHS) recorded a sharp increase in the number of samples of *P. pomeranicum* submitted by its members in the early 1940s and G. Fox Wilson, the then entomologist at the Wisley Laboratory, mapped the distribution of the scale (Fox Wilson, 1944). This is significant as it appears to be the earliest distribution map published for any scale insect species in Britain, and also provides baseline data to monitor subsequent changes in distribution.

The purpose of this communication is to report changes in the distribution and pest status of *P. pomeranicum* between 1944 and 2010 (66 years later) and to discuss possible causes.

Parthenolecanium pomeranicum (Kawecki) in Britain

Lecanium pomeranicum was originally described by Kawecki (1954) from specimens collected on yew in Poland. It was subsequently described as *Eulecanium taxi* by Habib (1955) from specimens collected from yew at Imperial College Field Station, Silwood Park, Sunninghill, Berkshire, during 1951–53; and reassigned to the genus *Parthenolecanium* by Borchsenius (1957).

It was first detected in Britain by Fox Wilson at a commercial nursery garden in Crawley, West Sussex, 14 June 1928 (Green, 1930, misidentified as *Lecanium corni crudum* Green). The stems and undersides of the foliage of a yew tree were heavily encrusted in scales. Adult males of the scale were observed to emerge in May (Gimingham, 1934, misidentified as *L. corni* Bouché) and described in detail by Green (1934, as *L. corni-crudum*). Green stated that the scale was causing serious damage to yew plants in Britain. It was misidentified as *P. corni* in Britain for many years until it was recognised as distinct by Habib (1955).

Geographical range

The present distribution of *P. pomeranicum* in Britain, based on RHS records, private collectors, and a small number of unpublished records held by The Food and Environment Research Agency (Fera), is shown in Figure 1. The records have been divided into four periods: 1928–1943 (Fox Wilson's 1944 map); 1944–1966; 1967–1988; 1989–2010).

The distribution data are not based on a systematic survey and need to be interpreted with caution. The vast majority of records were obtained from the RHS membership which is concentrated in south east England, inevitably giving a bias to the data (at least in frequency of reports). However, the Royal Horticultural Society has members throughout Britain who would notice the conspicuous damage that yew scale can cause, so any observed changes in distribution cannot be explained entirely by the distribution of RHS members (or by changes in the distribution of the host). Members of the Royal Horticultural Society are gardeners rather than entomologists and therefore only likely to detect and report the scale once populations have built up to damaging levels. Therefore the map is likely to show where the pest is abundant, rather than its true distribution. Despite these caveats there is a clear expansion in geographical range of the scale, both northwards and westwards.

Between 1928 and 1943 *P. pomeranicum* was restricted to southern England and recorded from 13 counties, most frequently in East and West Sussex and Surrey, but as far north as Huntingdon in Cambridgeshire. Between 1944 and 1966 it was reported widely in southern and central England, and had also become common in Buckinghamshire, Hampshire, Kent and Wiltshire. It was by then found as far north as Ffynnongroyw, Flintshire, Wales. There were relatively few reports during the period 1967 and 1988, but it was found as far west as Dartington, Devon. Between 1989 and 2010 it reached as far north as Kettleshulme, Cheshire and Nunnington, North Yorkshire.

Abundance

The highest total number of reports of *P. pomeranicum* is from Surrey (59 reports) followed by Hampshire (22), North Yorkshire (21), West Sussex (20) and Kent (19). Five or more reports have also been received from Berkshire, Buckinghamshire, Dorset, East Sussex, Hertfordshire, Middlesex, Oxfordshire, Suffolk and Wiltshire.

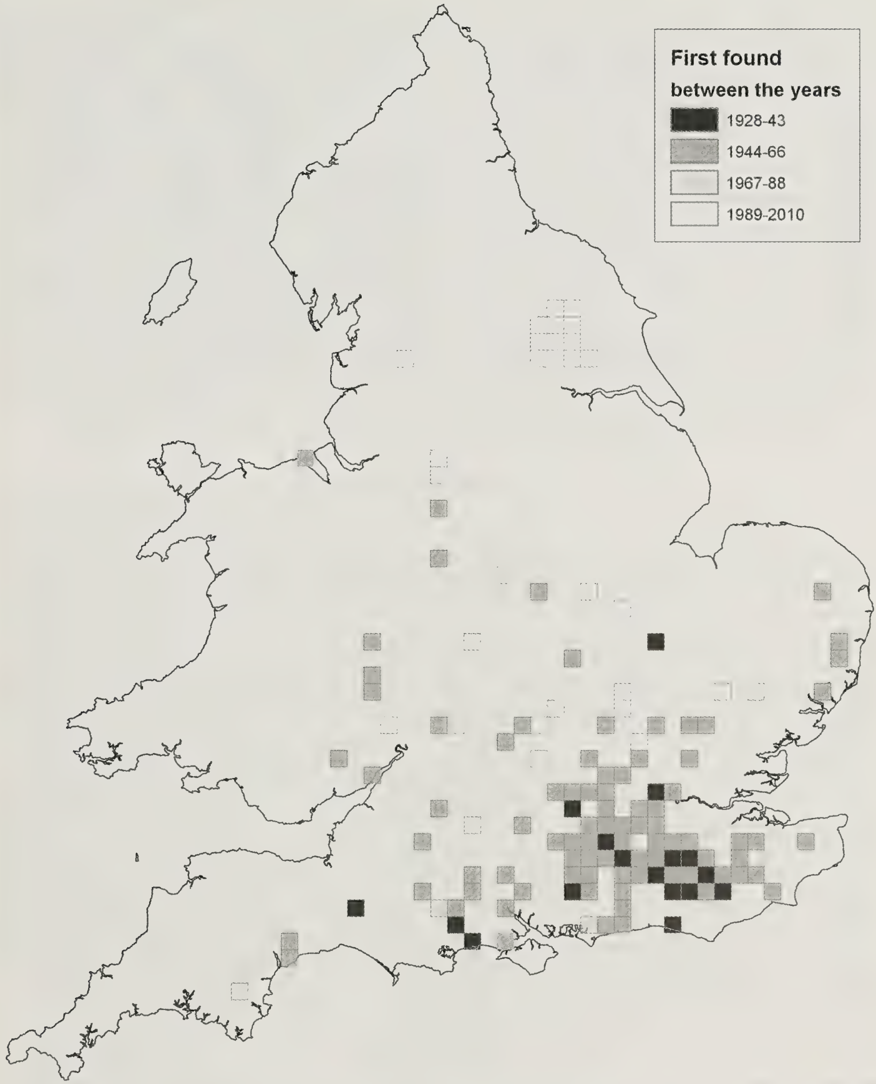

Fig. 1. The distribution of *Parthenolecanium pomeranicum* in Britain between 1928 and 2010. Each square represents 10km.

All of these counties are located in southern England, with the exception of North Yorkshire, but the latter's inclusion is due to more intensive recent collecting by the first author.

During November and December 2010, the first author searched for *P. pomeranicum* on yew at twenty-two locations (mostly churchyards) in or near York, North Yorkshire. The scale was found at 19 (86%) of the sites examined. They were found on both young plants and mature trees. The scales were most often detected on trimmed hedges, but this may be due to the fact that these plants were

more easily examined. Yew scale often occurred together with cottony camellia scale, *Pulvinaria floccifera* (Westwood) (Coccidae), but the two species are easily separated in the field. Each adult female cottony camellia scale produces a conspicuous elongate white ovisac on the undersides of the foliage. The adult drops off the plant after oviposition but remnants of the ovisac remain throughout the autumn and most of the winter (particularly on sheltered parts of the host). Adult female yew scales (Plate 9, Fig. 3) do not produce an ovisac and usually remain attached to the host throughout the winter. The overwintering nymphs of cottony camellia scale are usually pale yellow, whereas those of yew scale are orange or reddish-brown. In most cases the overwintering second instar stage of yew scale was observed before the adults. This is because they are far more numerous (each adult female can produce up to 3000 eggs (Kosztarab & Kozár, 1988)) and occur on the foliage where their reddish-brown body colour contrasts strongly with the green substrate. The adults were far less numerous and often occurred on the bark where they were camouflaged and more difficult to detect. All historical and recent records of yew scale recorded here were confirmed by the presence of adult females.

Pest status

Two hundred and sixty-three records of *P. pomeranicum* in Britain have been collated and divided into periods of five years (Fig. 2). This shows a rapid increase in the number of reports of *P. pomeranicum* in the 1940s, reaching a peak during the period 1946–1950. It then declined sharply to the 1960s and continued at a low level until it again increased during 2006–2010. Fox Wilson's interest in the yew scale is likely to have influenced the increase in the number of reports during the 1930s and 1940s (Fox Wilson, 1944). However, this interest alone does not explain the large increase in the number of reports during 1946–1950 (which came from many different locations in central and southern England). The peak in 2006–2010 has already been explained as being due to recent intensive collecting by the first author.

The number of reports by RHS members is highly likely to be related to the damage/symptoms caused by the scale. Therefore the yew scale appears to have become less important as a pest in recent decades than it was during the 1940s, 50s and early 60s. However, it still has the potential to cause damage in Britain. The first author has observed an enormous population of yew scale damaging part of a mature yew tree in a churchyard in Huntingdon, York, June 2009; and Fera received a sample of yew heavily infested with scales from a commercial plant nursery in Surrey, November 2010.

Discussion

Parthenolecanium pomeranicum is native to Europe and its principal host *T. baccata* is native to western, central and southern Europe, northwest Africa, northern Iran and southwest Asia. It would therefore appear reasonable to conclude that *P. pomeranicum* could be native to Britain. However, it was not recorded in Newstead's comprehensive monograph of the Coccidae of the British Isles (Newstead, 1903) and was only first detected in Britain in 1928, when it was found at a commercial plant nursery in southern England. It can be transported by international plant trade and by private individuals. For example, it has been detected at commercial nurseries in England on yew plants imported from the Netherlands and the most northerly record is on a small yew plant in a private garden in Nunnington, North Yorkshire that originally came from Bedfordshire and

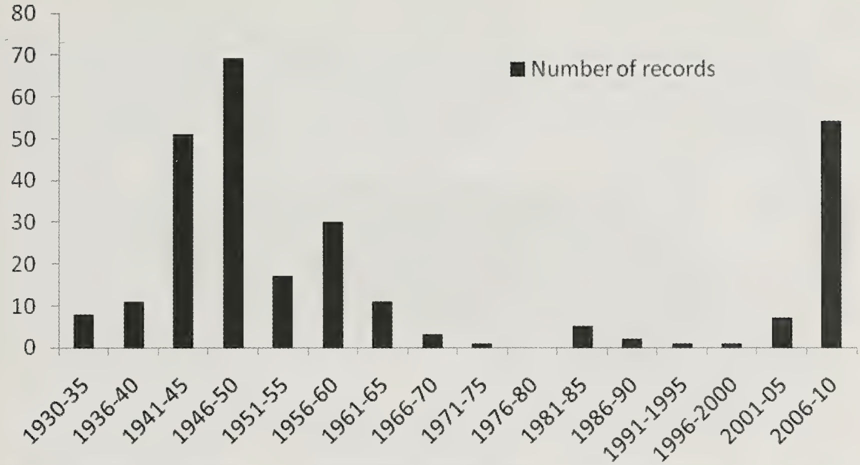

Fig. 2. Number of reports of *Parthenolecanium pomeranicum* in Britain between 1930 and 2010 divided into five yearly intervals.

was moved by the owner (Roger Hammon, pers comm., 2009). It has also been found on newly planted yew plants at the Food and Environmental Research Agency's laboratory in Sand Hutton.

It was reported to be a serious pest in southern England between the 1930s and early 1960s (Green, 1930; Fox Wilson, 1944; RHS, unpublished records), after which it has rarely been reported as a pest. The evidence available supports the hypothesis that *P. pomeranicum* is not native to Britain, but was introduced from continental Europe, probably with plant trade, in the 1920s. It is likely to have spread naturally locally from introduction sites (the first instars are active and may be dispersed by wind in a similar way to that demonstrated in other coccids (Washburn & Frankie, 1985: Barras, Jerie & Ward, 1994) and over longer distances by anthropogenic activities. The apparent decline in importance as a pest may be due, at least in part, to it being controlled by a complex of natural enemies, either introduced or already present in Britain. For example, there are at least four species of chalcidoid present in Britain that have been recorded attacking *P. pomeranicum* (Aphelinidae: *Coccophagus lycimnia* Walker, Encyrtidae: *Blastothrix longipennis* Howard, *Metaphycus insidiosus* Mercet and *Metaphycus zebratus* Mercet) (Universal Chalcidoidea Database, http://www.nhm.ac.uk/research-curation/research/projects/chalcidoids/).

Parthenolecanium pomeranicum is likely to continue its geographical expansion northwards in Britain, as it has been found as far north as Lithuania (Malumphy, Ostrauskas & Pye, 2008) and Sweden (Gertsson, 2000; Ossiannilsson, 1951). It is only occasionally an economic important pest of yew on the continent and is likely to be no more significant in Britain.

Acknowledgements

The authors would like to thank Roger Hammon, Daniel Malumphy and Joe Ostoja-Starzewski for collecting samples of yew scale and Dominic Eyre of the Food and Environmental Agency for producing the map.

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SHORT COMMUNICATION

Findings of mole crickets *Gryllotalpa* spp. (Orthoptera: Gryllotalpidae) in England in association with imports. – Each year thousands of arthropod specimens consisting of hundreds of species are found by the Plant Health and Seeds Inspectorate (PHSI) in association with plant material imported into England and Wales, and submitted to The Food and Environment Research Agency (Fera) laboratory at Sand Hutton for identification. One of the most impressive and instantly recognizable insects collected by the Plant Health and Seeds Inspectorate during 2011, on two separate occasions, were live adult European mole crickets *Gryllotalpa gryllotalpa* (L.) *sensu lato*. The mole cricket is a large burrowing insect with characteristic huge spade-like forelegs, similar to those of a mole (Fig. 1; Plate 9, Figs. 5 & 6), a brown body covered in velvety hair, and about 45mm in length. Recent findings of European mole crickets in gardens and garden centres have been summarised by Pinchen (2005, 2006, 2009 and *in press*). Mole crickets are rarely detected by the PHSI, and the purpose of this communication is to publish collection details, for the first time, of mole crickets found in association with imports, recorded by The Food and Environmental Research Agency. Two taxa have been intercepted by the PHSI, the *G. gryllotalpa*

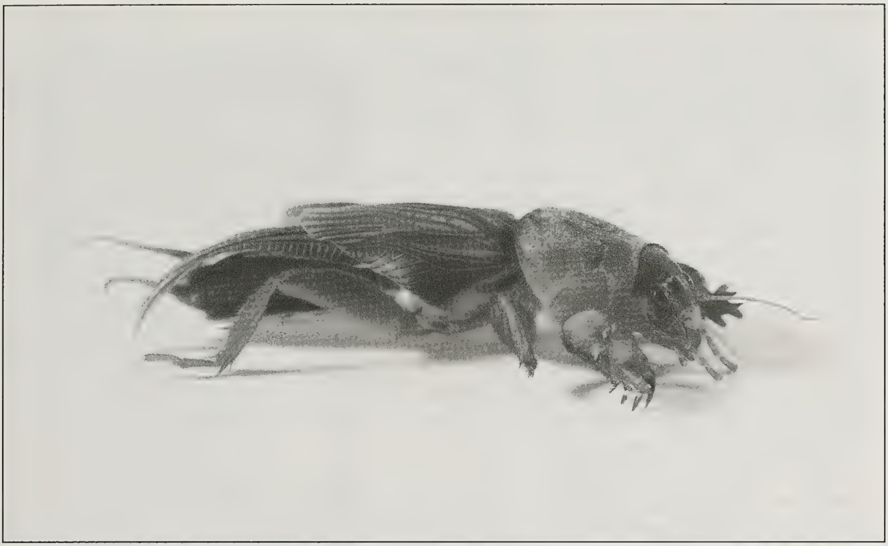

Fig. 1. European mole cricket, *Gryllotalpa* spp, (Orthoptera: Gryllotalpidae).

group and the African mole cricket *Gryllotalpa africana* (Palisot de Beauvois). The *G. gryllotalpa* group contains several sibling species occurring in Europe and the Mediterranean region that have been separated primarily on chromosome number, in addition to morphology, acoustic behaviour and cuticular hydrocarbon pattern (Broza, Blondheim & Nevo, 1998). Nickle and Castner (1984) suggested that *G. africana* may also consist of a complex of several sibling species.

Single adults of the *G. gryllotalpa* group have been found on six separate occasions: ENGLAND, Greater Manchester, Manchester, with kibbled onions (*Allium cepa* L.) imported from Egypt, 1966 (leg. B. V. H. Turner) (Ref. 94/1966), determined by D. R. Ragge of the Natural History Museum; Manchester, with tomato (*Solanum lycopersicum* L.) paste imported from Turkey, 5.xi.1973 (leg. M. E. Deardon) (Ref. 150/1973), det. R. G. Adams of the Ministry of Agriculture, Food and Fisheries; Manchester Airport, with cargo imported from France, Paris, 27.iii.2011 (leg. C. Varey of the PHSI) (Ref. 21105701), det. C. Malumphy of Fera; Kent, Paddock Wood, with melon (*Cucumis melo* L.) fruit imported from Spain, viii.1980 (leg. PHSI) (Seymour & Kilby, 1981); Lincolnshire, Boston, with cabbage (*Brassica oleracea* L.) imported from the USA, 10.iv.1996 (leg. J. Beever, PHSI) (Ref. 962618), det. C. Malumphy; Spalding, with mature plants imported from Italy and Spain, 8.vii.2011 (leg. J. Snowden, PHSI) (Ref. 21112760), det. C. Malumphy.

Single adult *G. africana* have been found on two occasions: ENGLAND, Cambridgeshire, Doddington, with *Ficus* sp. imported from Africa, 14.vii.1976 (Ref. 76–166), det. B.C. Townsend for the Commonwealth Institute of Entomology; West Sussex, Littlehampton, with poinsettia (*Euphorbia pulcherrima* Willd. ex Klotzsch) cuttings imported from Kenya, 8.vii.2002 (leg. A. Gaunt of the PHSI) (Ref. 202475), det. C. Malumphy of Fera.

The *G. gryllotalpa* group is widespread in Europe and the Mediterranean region and has been introduced to eastern parts of the USA. Adults and nymphs live

underground throughout the year in extensive tunnel systems a few centimetres beneath the surface, but which may reach a depth of over a metre in the winter. They are omnivorous, feeding on roots, tubers and rhizomes and a range of soil invertebrates. In the UK this species is protected (GB Red List, Schedule 5 of Wildlife Countryside Act 1981) and it is a Natural England UK Biodiversity Action Plan (BAP) priority species, as there were only four confirmed sightings between 1970 and 2001 (see Pinchen *in press* for subsequent findings). It was previously recorded in at least 33 vice-counties, mainly across southern England but also in South Wales, western Scotland and Northern Ireland. Its geographical range, however, has contracted significantly and it appears to be on the verge of extinction in the UK, which has been attributed to long term climate changes (Burton, 1989). What appears to be the last remaining population has been reported from the New Forest, Hampshire (Pinchen, 2009).

Gryllotalpa africana has been reported to occur widely in Africa, Asia, Australia and Hawaii, but according to Townsend (1983) it only occurs in Africa. It is univoltine and has a similar biology to species of the *G. gryllotalpa* group (Graaf, Schoeman & Brandenburg, 2004).

The *G. gryllotalpa* group has been accidently introduced to eastern USA, presumably with trade (Nickle & Castner, 1984). The accidental import of individuals of the *G. gryllotalpa* group into England and Wales are such infrequent events, and in such small numbers, that they are unlikely to significantly influence the decline of the mole cricket in the UK, although transient populations may occur.

Gryllotalpa gryllotalpa is protected by law in Britain and if found in the wild should not be handled without a licence issued by Natural England. Any suspected findings in Britain should be reported to Bryan Pinchen, co-ordinator of UK BAP Mole Cricket project (*bryanpinchen@hotmail.co.uk*) – CHRIS MALUMPHY, The Food and Environment Research Agency, Sand Hutton, York, YO41 1LZ, UK.

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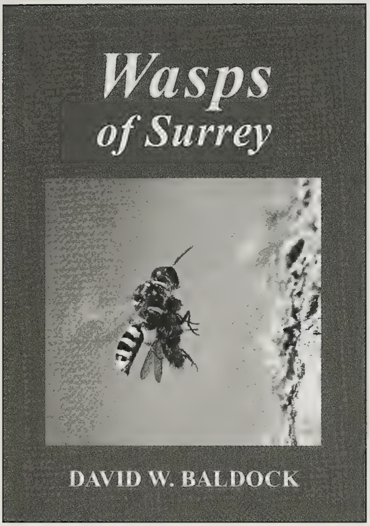
BOOK REVIEW



Wasps of Surrey by David Baldock. Published by the Surrey Wildlife Trust, September 2010. Hardback, 336 pages (plus 48 colour plates). £18.00 plus p&p. ISBN 978 0 9556188 2 6.

This is the twelfth volume in an ongoing series covering the flora and fauna of Surrey and those who already possess other recent volumes will immediately feel 'at home' with this book since it follows the same style and layout. Obviously, it is a close companion to David's *Bees of Surrey* published in 2008 and, alongside John Pontin's 2005 volume covering ants, the Surrey hymenopterist now has an embarrassment of riches at their disposal.

As with the companion bees title, the introductory chapters cover such matters as the geology and climate of the county, how to search for the insects, an appraisal of historical recording in Surrey and, a novel introduction, a very short appraisal of the fossil record. Although limited to just nine spheciform species, this provides an interesting insight into what we know (or don't know!) about the evolution of these sophisticated insects. Importantly, the author sets out the methods by which the data for the atlas have been gathered. The gathering of existing data has been augmented by an impressively intensive survey period, deploying malaise traps and other techniques to improve the coverage of species.

The results section appraises gains to the Surrey fauna along with re-discoveries, losses and lists the 28 aculeates from the British list that have never been recorded in the county. This incredibly small numbers serves to illustrate the value of this diverse county to aculeate Hymenoptera conservation. Nearly 30 pages are then dedicated to analysis of habitats of importance for wasps, identifying provisional 'indicator species' for different key habitats and then illustrating each habitat by reference to the wasp fauna of specific sites in the county.

The identification key provided is rather more limited than that in the companion bee volume, which identifies specimens to Genus level. In the present title a key to all families of aculeate Hymenoptera is provided, including those tricky "DEBs" (Dryinidae, Embolemidae and Bethylidae), social wasps, spider-hunting wasps and bees as well as the two digger wasp families. This lack of Genera key tackling the wasps is less of a handicap than it would be for bees, since there are keys available elsewhere (e.g. Naturalists' Handbook series) to many of these species.

The species accounts are thorough and informative. Entries cover national status, county status, comments made in the old Victoria County history and ecological notes as well as a summary of key Surrey localities. As with other books in this series, distribution maps are overlain on a simplified geological map of the county, allowing for some clear correlation with substrate types to be apparent. Although hugely under-recorded nationally, the DEBs are tackled with equal attention, summarising historical records but also including material taken during the atlas survey work. Neither does the author shy away from tackling the problematic *Chrysis ignita* aggregate within the jewel (ruby-tailed) wasps, with each species in the group

meticulously analysed individually. Much of this section covers the digger wasp families Crabronidae and Sphecidae, but also included are the social wasps, potter and mason wasps, spider-hunting wasps, velvet-ants and allied insects.

The statistic of '48 colour plates' belies the richness of illustrations provided since each plate typically comprises between 3 and 6 photographs, so that there are, in fact, nearly 180 superb pictures of the insects covered by the book. Most of these are of live insects although a few pinned specimens help illustrate some real rarities or exceedingly small species. The 'live action' photos of insects in flight or going about their business are a delight and really show the character and variability of these creatures.

Such is the richness of the Surrey fauna that those living in neighbouring counties (and beyond) will find much of use and interest here. The discussions on survey techniques, ecology, habitat preferences and notes on distribution will hopefully inspire other naturalists to consider this under-recorded group and further advance our knowledge of the UK Hymenoptera fauna.

ADRIAN KNOWLES

SHORT COMMUNICATIONS

***Enochrus quadripunctatus* (Herbst) (Col., Hydrophilidae) in Berkshire**. – On 23 June 2011, I found two adult male *Enochrus quadripunctatus* in the mossy edges of a field pond near to Barrow Farm Fen (SU4697) in VC22 (part of modern Oxfordshire), the first for VC22 (Prof. Garth Foster *pers. comm.*). The habitat agrees well with that described by Foster (*A review of the scarce and threatened Coleoptera of Great Britain, Part 3: Aquatic Coleoptera,* JNCC, 2000), who states that it 'occurs in base-rich lowland fens, and in well-vegetated parts of shallow pools on an otherwise exposed substratum'. The site was a perfect example of the latter adjacent to and directly fed by the former! The same pool yielded other local species including, *Agabus uliginosus* (L.), *Ilybius fenestratus* (Fabr.) (Dytiscidae) and *Haliplus obliquus* (Fabr.) (Haliplidae) which was abundant amongst the stonewort *Chara vulgaris*. – J. S. DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

***Phloeosinus bicolor* (Brullé) (Curculionidae, Scolytinae) in East Sussex and Surrey.** – On 26.v.2011, whilst surveying fields near Rocky Lane, Haywards Heath, East Sussex (TQ3222), I came across a large pile of dead Cypress branches, and uprooted small trees, these were riddled with the emergence holes of *Phloeosinus* (Fig. 1). After much bark peeling I eventually found several dead adults which had failed to emerge, these later proved to be *P. bicolor*. This is the first record from Sussex (Peter Hodge *pers. comm.*). Previously on 14.v. I found the same species in abundance in similar circumstances, in a pile of brash at Dunham Farm, Surrey (TQ0261). – JONTY DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

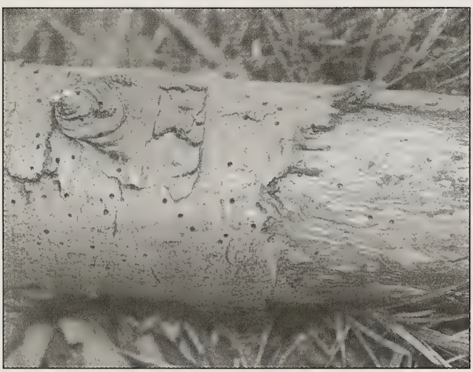


Fig. 1. Emergence holes of the scolytid beetle *Phloeosinus bicolor*.

2010 ANNUAL EXHIBITION

Imperial College, London SW7 – 13 November 2010

The following accounts of the exhibits were compiled by A. M. Jones (British Butterflies), S. P. Clancy (British Macrolepidoptera), R. J. Dickson (British Microlepidoptera), N. M. Hall (Foreign Lepidoptera), P. J. Chandler (Diptera), R. G. Booth (Coleoptera), A. J. A. Stewart (Hemiptera), D.W. Baldock (Hymenoptera), J. S. Badmin (Neuroptera and General). Exhibitors should be aware that compilers invariably have an onerous task when preparing the reports and it would be a great help if exhibitors could include email addresses with the exhibit reports that are handed in so that long accounts can be transferred electronically. For the third year in succession Joseph Botting kindly acted as exhibition photographer despite his imminent departure on a sabbatical to China to study fossils, where he is now. The cost of printing the plates was covered by a grant from the Hammond Memorial Fund.

This year the Society's Annual Dinner was held at the Strathmore Hotel, near the Natural History Museum, which is a short walk from our exhibition venue. Members who brought exhibits were able to leave them in a secure room downstairs so that they could relax and enjoy the buffet dinner. Drinks in the bar area beforehand proved to be a very lively and memorable occasion as we shared the room with a high-spirited hen party who were having one last drink before hitting the town. The buffet itself was held in the main dining room of the hotel which we just about filled. There were plenty of dishes to choose from and most of us queued for at least one second helping. The President, Darren Mann, was able to gain our attention and deliver a short speech during the proceedings. After the meal some members retired to the bar area to make use of the more comfortable seating there and to continue discussing entomology. By all accounts this was a thoroughly enjoyable occasion (though the drinks were expensive) and the venue has been booked for next year.

Mike Simmons, Exhibition Secretary, deserves our special thanks once again for ensuring that this year's Annual Exhibition ran smoothly without any apparent technical hitches.

Butterflies

Bailey, K. E. J. – Results of breeding experiments during 2010. Continued results of temperature experiments with young pupae in raised oxygen levels. *Boloria selene* (D.&S.), an extreme ab. *veta* Motschulsky from high temperature shock shown with an upper side and underside ab. *vanescens* Cabeau from high and low temperature shock in normal oxygen levels, all bred ex Devon female. *Argynnis paphia* (L.) two unusual aberrations: a male underside with increased silver areas (Plate 10, Fig. 1) and a female with the central areas of the forewings strongly blackened, both resulting from low temperature shock. These were shown with two pairs with the more usual type of melanism from low temperature shocks in normal oxygen levels, all bred ex Gloucestershire female. *Issoria lathonia* (L.), strong aberrations from heat shocks all ex French stock. *Melitaea cinxia* (L.), a male ab. *fulla* Quensel and a lightly marked female underside from high temperature shocks, bred ex commercial stock. *Melitaea athalia* (Rott.), an aberration appearing intermediate between ab. *cymothoe* Bertolini and ab. *corythalia* Hübner from cold shock, ex inbred captive stock. Specimens of *Euphydryas aurinia* (Rott.) ab. *sebaldus* Schultz resulting from cold

shocks, all ex inbred commercial stock. *Aglais urticae* (L.) ab. *semiichnusoides* Pronin, from heat shock all ex wild Buckinghamshire larvae. *Apatura iris* (L.), a female underside with the orange area around the forewing ocelli extended to cover much of the normal dark areas and with extended grey to the borders, resulting from heat shock, bred as a second generation from wild Buckinghamshire stock.

A male *Apatura iris* with underside showing homoeosis to the left hind wing (Plate 10, Fig. 5), in addition there were other abnormalities; the genitalia were extruded and there was weakness in the left forewing venation near the base. The specimen was an F_2 from survivors of a catastrophic episode when the parental generation was almost eliminated by a windborne permethrin-based formulation when the owners of an adjoining property sprinkled ant killer in very high concentration onto their lawn. This caused a large percentage of otherwise healthy larvae to vomit and have diarrhoea of a purple colour. Some larvae surprisingly recovered and were used in the breeding stock. This F_2 stock showed other abnormalities in 2010. One pupa and its adult had a second leg missing and a male emerged with a deformed hind wing. Several larvae failed to pupate. The exhibitor wonders if permethrin causes permanent and heritable genetic damage and intends to note and record any further occurrences in this stock.

In April 2010, the exhibitor was invited to participate in breeding experiments on *Polyommatus celina* (Austaut) and *Polyommatus icarus* (Rott.) by Martin Gascoigne-Pees. The former species appears to replace *P. icarus* in N.W. Africa and some Canary Islands and the males are particularly distinct with sub-marginal black spots. *Polyommatus celina* is now regarded as a separate taxon with considerable differences in DNA sequences from *P. icarus* and is believed to have evolved from a common ancestor 1.1–2.9 million years ago according to Dr. Martin Wiemers in a recent manuscript made available to the exhibitor. (Reference: A molecular phylogeny of *Polyommatus s. str.* and *Plebicula* based on mitochondrial COI and nuclear ITS2 sequences (Lepidoptera: Lycaenidae) Wiemers, M., Stradomsky, B. V. & Vodolazhsky, D. I. 2010. *European Journal of Entomology* **107**: 325–336).

Eggs of *celina* were given to the exhibitor by M. Gascoigne-Pees and resulting females were paired to wild English *icarus* males. F_1 hybrids were paired and many eggs obtained but 99% of the eggs were infertile, however one F_2 larva was analysed and found to have *celina* mitochondrial DNA. The male hybrids have an appearance intermediate between *celina* and *icarus*; however the females strongly resemble female *celina*.

Pairings were also obtained between F_2 *celina* males and captive bred English *icarus* females. The resulting F_1 hybrids had males intermediate between *celina* and *icarus* but females resembling the parent female *icarus*. The exhibitor believes that the female characters in both instances might be carried in the mitochondrial DNA whereas the male characters are carried in the autosomes. Pairings from this stock resulted in many fertile ova and final instar larvae from this generation were exhibited. This suggests that the hybrid nucleus is more compatible with the cytoplasm and its inclusion bodies from a female *icarus*.

Some F_3 pure bred *celina* were exhibited showing increased blue scaling in the females when compared to original F_1 specimens. The exhibitor suggests that this may be due to environmental factors.

BATTEN, A – Butterfly aberrations taken in Sussex during 2010. *Argynnis paphia* (L.). Three males showing melanic variation: an ab. *confluens* Spuler, an ab. *ocellata* Frings and a fine ab. *nigricans* Cosmovici (Plate 10, Fig. 4), together with an upper and underside of ab. *obliterae* Robson & Gardner of *Limenitis camilla* (L.). All of

these butterflies were taken from the same locality in July. *Melanargia galathea* (L.), a female ab. *rubra* Mosley (Plate 10, Fig. 7).

BUTLER, A. L. – A male *Argynnis paphia* (L.) ab. *confluens* Spuler captured in a wood in South Northamptonshire on 11.vii.2010. This species has only just started to return to these particular woodlands in the last three years with singletons being observed, this is after an apparent absence for some 50 years.

Thecla betulae (L.), a male specimen from wild ova, reared under natural conditions. This had pale crescent marks near the apex of the hindwings, these did not appear pathological and the underside was normal (Plate 10, Fig. 2), emerged 10.vii.2010. Other *betulae* exhibited from long cold shock treatment to pupae in 2009. A batch of 32 pupae were treated, these resulted in 12 aberrations ranging in extremes from obsolescence of the underside bands to significant widening.

Three short series of *Pieris napi thomsoni* Warren to show comparisons between different locations; specimens taken at Ophir, near Kirwall Orkney mainland 7/8.vi.2010, specimens from Dunnet Head, Caithness the most northerly point on the British mainland 6.vi.2010, and specimens from the Isle of Skye taken or bred in June 2005 and 2006. The females from Orkney were noticeably darker and with more yellow buff suffusion than those from other Scottish locations. Both sexes also appeared noticeably smaller, the exhibitor noted that the larval food plant, *Cardamine pratensis*, growing where the butterflies were flying was shorter and with less foliage than observed on the mainland and this may account for the smaller than average size of the butterflies. The females from Caithness were very dark but lacked the yellow buff ground colour, the males showed much variation in size and intensity of the postdiscal spots. The Skye females were typical of the subspecies *thomsoni* but the males seemed larger than those from Orkney and Caithness.

George Thomson suggests that the butterfly is possibly univoltine on Orkney but that it may not be the case on the Scottish mainland. When the exhibitor bred specimens from Skye he found that a 20–30% of the first generation pupae emerged as a second brood during the same year. Stock is currently being reared from both Caithness and Shetland under identical conditions of day length, temperature and food plant etc. It is hoped that this will demonstrate any differences in voltinism and genetic difference in adult size between populations; so far the pupae from Shetland appear on average smaller than those from the mainland.

Examples of *Pieris napi sabellicae* (Stephens) from Northamptonshire were also exhibited for comparison with the Scottish specimens.

HENWOOD, B. – A female specimen of *Thymelicus sylvestris* (Poda) accompanied by the following note "For a few years there have been reports of *Thymelicus lineola* (Ochsenheimer) from Braunton Burrows, North Devon (VC4). On 9.vii.2010 a female *thymelicus* was found dying at Braunton Burrows SS453354. The undersides of the tips of the antennae were noted to be unquestionably black and so it was submitted to the committee of the Devon branch of Butterfly Conservation as a record of *T. lineola*. However, it seemed unlikely that *lineola* would occur at Braunton Burrows as it is so far from the nearest colony. Dissection of the genitalia proved that the superficial character of antennal tip colour to have been misleading and confirmed beyond any doubt that the butterfly was in fact *T. sylvestris*."

JONES, A. M. – Breeding results with *Polyommatus icarus* (Rott.) ab. *glomerata* Tutt. A female ab. *glomerata* was taken on 31.v.2010 and the F_1 reared in July comprising 95 individuals, 37 type and 58 minor *glomerata* (61%). A partial F_2 generation was reared in August/September comprising 29 butterflies, 4 type (14%), 10 (34.5%) minor *glomerata*, 8 (27.5%) good *glomerata* and 7 (24%) extreme

glomerata. This would indicate a dominant gene, the more minor *glomerata* in the F_1 & F_2 being heterozygous and the extreme *glomerata* in the F_2 being homozygous.

Two extreme mixed gynandromorphs of *P.icarus* bred in 2010 from different broods and localities, both in small F_1 generations. The first, left side predominantly male and right side female, emerged 30.vii.10 in a brood 30, with 12 males and 17 females. The second individual (Plate 10, Fig. 8) emerged 9.x.10 in a brood of 32, with 17 males and 14 females.

Argynnis paphia (L.), a very dark and fresh male ab. *ocellata* Frings. This was one of the more extreme aberrations encountered in *paphia* by the exhibitor during 2010. Aberrations proved to be frequent in many nymphalid species during late June and July at various south eastern localities in the UK. Many species were common and melanics were noted in *A. paphia, Limenitis camilla* (L.) and *Polygonia c-album* (L.).

PARKER, M. J. – *Coenonympha pamphilus* (L.), ab. *detersa* Verity (Plate 10, Fig. 10), a male of the rare light form captured on the costal footpath near Weston on Portland, Dorset on 8.ix.2009.

TEBBUTT, P. – Specimens bred during 2010. *Argynnis paphia* (L.) specimens from cold shocked pupae, the brood contained large numbers of ab. *confluens* Spuler, one of which was shown together with three varying ab. *ocellata* Frings and a male ab. *nigricans* Cosmovici. *Boloria selene* (D. & S.). The exhibitor was given a large number of *selene* larvae by Karl Bailey in the spring, they fed for a long period, some well into June when others were pupae or adults, but for some unknown reason the larvae remained small. Because of this only a few pupae were given temperature treatment; however the results were spectacular with half producing ab. *nigricans* Oberthur. One slightly larger specimen had heavily melanic upperside but near normal underside forewings with heavily silvered areas on the hindwings.

Satyrium pruni (L.). Three examples from temperature experiments: one from heat shock with the orange bands and black hind wing spots radiating and the other two caused by long cool shock, one with white bands reduced, the other with these almost absent, ab. *albobsoleta* Verity. *Thecla betulae* (L.) (Plate 10, Fig. 6) from long cool-shocked pupae, six specimens with variable undersides up to ab. *unistrigata* Schultz.

Lycaena phlaeas (L.). Four bred specimens from untreated stock: a female with the right fore wing pale, a female with enlarged spots ab. *extensa* Tutt on the left forewing and two bilateral gynandromorphs (Plate 10, Fig. 3) which emerged within a few days of each other, and were the exact opposite of each other.

BRITISH MACROLEPIDOPTERA

BUTCHER, A. G. J. – From Barham, Kent, an example of the scarce immigrant *Drepana curvatula* (Borkh.) taken on 12.vi.2010, and an unusual form of *Macaria signaria* (Hübn.) taken on 1.viii.2010 which the exhibitor considered may be a hybrid with *M. liturata* (Clerck). From Folkestone, Kent, on 9.viii.2010, minor aberrations of *Selenia dentaria* (Fabr.) and *Noctua janthina* (D. & S.).

CLARKE, J. H. – A selection of moths that included the first British example of the attractive noctuid *Achaea janata* (L.), an adventive bred from a pupa found on a supermarket pomegranate on 2.ix.2010 (Plate 11, Fig. 8). The fruit was likely to have been imported from India or Israel, and a similar pupa had been found by the exhibitor in these circumstances on 29.vii.2010; this failed to produce an adult but was probably the same species. Other moths shown included the rare, pale ab. *pollutaria* form of *Lomaspilis marginata* (L.) from Lough Carragh, Co. Kerry, on 27.v.2010 (Plate 11, Fig. 12), and from the same locality and date examples an unusual form of *Diaphora mendica* f. *rusticata* (Hübn.) (Plate 11, Fig. 3) and

Hydriomena ruberata (Frey.). Other exhibited moths included one of at least 50 immigrant *Itame brunneata* (Thunb.) seen at Covert Wood, Kent on 23.vi.2010, with a *Hepialus humuli* ab. *albida* Spuler shown recorded from the same site and date; *Dendrolimus pini* (L.) from Kiltarlity, Inverness-shire, on 16.vi.2010; *Pennisetia hylaeiformis* (Lasp.) from Hertfordshire on 21.vii.2010, including a female found at rest; and an asymmetrically marked example of *Agrotis clavis* (Hufn.) from Crawley Down, Sussex on 5.vii.2010.

CLIFTON, J. – Some moths from a week spent along the western shores of Loch Linnhe, Fort William in late September 2010 that comprised examples of the following species: *Thera obeliscata* (Hübn.), *Celaena leucostigma scotica* (Cockayne), *Xestia castanea* (Esp.), *Epirrita filigrammaria* (H.-S.), *Dryobotodes eremita* (Fabr.), *Amphipoea lucens* (Frey.), *Xylena vetusta* (Hübn.), *Agrochola circellaris* (Hufn.), *Coenocalpe lapidata* (Hübn.), *Aporophyla nigra* (Haw.), *Chloroclysta miata* (L.), *Chloroclysta truncata* (Hufn.) and *Chloroclysta citrata* (L.).

COOK, R. R. – A selection of moths caught or bred in 2009 or 2010 that included *Pennisetia hylaeiformis* (Lasp.) from Hertfordshire on 16.vii.2010; *Synanthedon scoliaeformis* (Borkh.) from Cannock Chase, Staffs., on 26.vi.2010; *Dendrolimus pini* (L.) from Kiltarlity, Inverness-shire, on 24.vi.2010; and *Cyclophora ruficiliaria* (H.-S.) from Maenporth, Cornwall in viii.2009.

DYKE, R. – A single moth exhibit showing an aberration of *Diaphora mendica* (Clerck) from Hockwold, Norfolk on 24.iv.2010.

GEORGE, A. M. – An exhibit that included examples of two species recorded during 2010 as new to the Ruislip LNR, Middlesex: *Archanara sparganii* (Esp.) taken on 16.viii., and *Macrochilo cribrumalis* (Hübn.) taken on 7.vii.

HALL, N. M. – From Berkshire a number of species of interest for the county that included *Eilema caniola* (Hübn.), two of four examples from Earley; *Meganola strigula* (D. & S.), one of at least six examples recorded from Snelsmore Common, 9.vii.2010; *Lampropteryx otregiata* (Metcalfe), one of four specimens caught by P. Black in v/vi.2010 at Snelsmore Common; *Macrochilo cribrumalis* (Hübn.) taken by B. Clark in Windsor Forest on 7.vii.2010; and *Archanara dissoluta* (Treit.) from Earley, 26.vii.2010. Other moths shown included unusual forms of *Thera obeliscata* (Hübn.) from Padworth Common, Berks on 13.vii.2010, and *Thalpophila matura* (Hufn.) from Bozedown, Oxon., on 7.viii.2010 (Plate 11, Fig. 1).

HAYWARD, R. – A number of species of local interest recorded from the exhibitor's garden in Wokingham Without, Berkshire, most notably *Rhodometra sacraria* (L.) on 4.x.2010; two examples of *Thera cupressata* (Geyer) taken on 7 & 9.x.2010; *Hypomecis roboraria* (D. & S.) on 20.vi.2010; *Amphipoea fucosa* (Frey.) on 17.vii.2009; an unseasonal *Laspeyria flexula* (D. & S.), one of two seen on 9.x.2010; *Scopula immutata* (L.), one of two seen on 1.vii.2010; and *Idaea straminata* (Borkh.), 26.vii.2010. Also a late and well-marked individual of *Eupithecia dodoneata* Guen., 10.vi.2010, det. Martin Honey.

A number of variations and minor aberrations were also shown, the most interesting being a melanic example of *Drymonia ruficornis* (Hufn.) taken on 19.iv.2010 at Wokingham Without.

Two well-worn individuals of the noctuid *Xestia rhomboidea* (Esper) from Meopham, Kent, 24.viii.2010, det. M. Honey.

HENWOOD, B. P. – A photograph of a larva of *Cleorodes lichenaria* (Hufn.) beaten from blackthorn at Ipplepen, Devon on ii.2010, illustrating the cryptic markings and colouration against the larval pabulum of lichen.

JENKINS, A. – Examples of *Dendrolimus pini* (L.) from Kiltarlity, Inverness-shire; *Lymantria dispar* (L.) reared from larvae found on the Dorset coast; and *Coenocalpe*

lapidata (Hübn.) from Perthshire with a comment that females were readily disturbed by day but males were best obtained at car headlights at 4 a.m.

KNILL-JONES, S. A. – The usual varied and interesting selection of species recorded by the exhibitor at Totland, Isle of Wight during the 2010 season. Most notable among these were examples of *Dendrolimus pini* (L.) on 11.viii., *Hydriomena ruberata* (Frey.) on 26.vii., and two *Trachea atriplicis* (L.) on 29.vi. & 10.vii.; the latter species now being recorded with some regularity on the island and possibly resident.

LANGMAID, J. R. – The second British specimen of *Stegania cararia* (Hübn.) taken at Southsea, Hants, on 1.vii.2010; with from the same site the third and fourth VC11 records of *Hypena obsitalis* (Hübn.) recorded on 10.x.2009 and 27.vii.2010. An example of *Conistra rubiginea* (D. & S.) from Llangynidr, Breconshire, on 26.iv.2010 was shown as new to the county, and an aberrant *Aethalura punctulata* (D. & S.) with unchequered forewing fringes from the same site on 27.iv.2010 was exhibited. Also shown was an aberrant *Idaea dimidiata* (Hufn.) with a suffused basal forewing region taken by J. Stokes at Portchester, Hants, on 6.vii.2010.

MASTERS, I. D. – From Middleton-on-sea, Sussex, four species new to the site: two examples of *Cyclophora puppillaria* (Hübn.) (det. Peter Hall) taken on 8.viii. & 7.ix.2010; *Hylaea fasciaria* (L.), an example of ab. *grisearia* (Fuchs), 3.ix.2010; *Moma alpium* (Osbeck), taken on 18.vi.2010; and *Macdunnoughia confusa* (Steph.) on 18.viii.2010. Also specimens of *Calophasia lunula* (Hufn.) and *Platyperigea kadenii* (Frey.), recorded from the site in 2010 for the second successive year; and a dark, obscurely marked example of *Hadena bicruris* (Hufn.) (det. Peter Hall) recorded on 20.vi.2009 (Plate 11, Fig. 14).

MCCORMICK, R. F. – Species of interest recorded in Devon during 2010 by a number of recorders, although the specimens shown were not necessarily those recorded during the 2010 season. Species exhibited included the following: *Idaea rusticata* (D. & S.) from Uplyme (O. Woodland) 18.vii.2010, with a comment that one or two examples of this species now turn up in VC3 most years; *Idaea trigeminata* (Haw.), a rare species with confirmed records in Devon only since 2005 and two records in 2010 from Exmouth, 4.vi. (S. Elcoate) and Sampford Spiney, 23.vii.2010 (M. D'Oyly); *Idaea degeneraria* (Hübn.) details of 15 examples of this species in VC3 with a comment that a colony is now almost certainly established at Holcombe; *Thera cupressata* (Geyer), the first VC4 record from Croyde, 2.vii.2010 (A. Holwill); *Agrius convolvuli* (L.), only three records detailed from Uplyme, 2.ix.2010 (O. Woodland) and Kingsteignton, 14 & 15.ix.2010 (D. Stradling); *Acherontia atropos* (L.), two records detailed, one seen near Bideford, entering a beehive, 25.vi.2010 (L. Jones) and a larva in Plymouth, 20.ix.2010; *Hyles livornica* (Esp.), just one record from Heavitree, Exeter, 9.vi.2010 (G. & J. Jarvis); *Dryobota labecula* (Esp.), just one record in 2010 from Teignmouth, 30.x.2010; *Heliothis peltigera* (D. & S.), the only county record of the season, from Uplyme, 8.vi.2010 (O. Woodland).

OWEN, J. – Four species from the exhibitor's garden near Dymchurch, East Kent, that were recorded as new to the site in 2010: *Hepialus fusconebulosa* (De Geer) on 28.v., *Hippotion celerio* (L.) on 31.x., *Acronicta alni* (L.) on 27.vi., and *Chortodes fluxa* (Hübn.) on 16.vii.; these bringing the total number of macromoths recorded from this long-standing recording site to 519 species. Also shown from the same site in 2010 were examples of *Itame brunneata* (Thunb.), one of 14 recorded between 17.vi. & 26.vi.; *Lithosia quadra* (L.) from 29.ix.; *Lacanobia splendens* (Hübn.), one of seven recorded between 12.vii. & 18.vii.; and unusual forms of *Eilema depressa* (Esp.) and *Cryphia algae* (Fabr.).

PAGE, A. – A selection of species recorded or reared by the exhibitor during the 2010 season that included examples of *Synanthedon scoliaeformis* (Borkh.) from Cannock Chase, Staffs., on 25.vi.2010; *Idaea sylvestraria* (Hübn.) from Hasley in the New Forest on 13.vii.2010; *Eppirhoe tristata* (L.) recorded near Loch Arkaig, Inverness-shire on 24.vi.2010; and *Entephria flavicinctata* (Hübn.) reared from larvae found near Struan, Perthshire on 24.vi.2010.

PLANT, C. W. – An exhibit showing examples of *Noctua janthe* (Borkh.), *Noctua janthina* (D. & S.), and the recently described south-east European species *Noctua tertia* Mentzer, Moberg & Fibiger, with description of the differences between these three closely allied species.

PLATTS, J. – Two striking aberrations of the geometers *Plagodis dolabraria* (L.) and *Lomaspilis marginata* (Hübn.) taken in 2010 near Canterbury, Kent, both figured on Plate 11, Figs 5 & 6. Also bred specimens of *Hecatera dysodea* (D. & S.) from larvae found in the Whitstable area, Kent, during August 2009.

REID, I. – A probably unique streaked aberration of *Archanara sparganii* (Esp.) taken on 19.ix.2009 at Portholland, Cornwall (Plate 11, Fig. 4).

ROUSE, T. – An exhibit featuring a range of species of interest taken in Kent, unless otherwise stated during 2010, that included the following: *Cyclophora ruficiliaria* (H.-S.), the second county record, a female, from Densole on 27.viii.2009 with a specimen bred from it; the first county record of *Venusia cambrica* (Curt.) from Densole, 7.viii.; *Trachea atriplicis* (L.), one of two examples recorded at New Romney, 19.vii.; *Moma alpium* (Osbeck), Densole, 10.vii.; and a striking aberrant form of *Orgyia antiqua* (L.) exhibiting a scaling deformity (Plate 11, Fig. 2).

SCANES, J. – A selection of species recorded from the exhibitor's garden at Bexhill-on-sea, East Sussex during 2010, including seven colonist species now breeding in the area such as *Platyperigea kadenii* (Frey.) and *Pechipogo plumigeralis* (Hübn.). Other species exhibited included *Itame brunneata* (Thunb.), two on 16.vi.; *Hyles gallii* (Rott.), on 25.viii.; *Selenia lunularia* (Hübn.), one of five records of second-brood adults recorded between 26 & 29.vii.; *Lithosia quadra* (L.) on 26.ix.; *Eilema caniola* (Hübn.) on 27.viii; and two *Cryphia algae* (Fabr.) recorded on 22.vii.

SIMS, I. – An exhibit that included the first VC22 specimen of *Macaria signaria* (Hübn.) that had been taken at Ashley Hill Forest, Knowl Hill, Berkshire, on 26.vii.1996. Also shown were examples of *Hecatera dysodea* (D. & S.) bred from larvae found at Jealott's Hill, Berkshire, in 2010, with mention of larvae of this species being found recently at two other sites in the county.

SKINNER, B. F. – A series of *Lacanobia splendens* (Hübn.) bred from a female taken at Dungeness, Kent, on 21.vii.2010. This is the first time this scarce migrant has been successfully reared in Britain, and the exhibit included photographs of the live insect in its larval, pupal and adult stages.

THIRLWELL, I. R. – A striking and very unusual gynandromorph specimen of *Laothoe populi* (L.) recorded at light in Portsmouth, Hampshire, on 19.vii.2010 (Plate 11, Fig. 13).

WARING, P. – Specimens were exhibited of *Chortodes extrema* (Hübn.), *Adscita statices* (L.), and *Synanthedon myopaeformis* (Borkh.) from the exhibitor's garden at Werrington, Northants collected during 2010, with a comment that the last species was attracted to a ten year-old pheromone lure. Following publication of the *C. extrema* record (*British Wildlife* **21**:435), Jonathan Newman informed the exhibitor that he had recorded five individuals of this species in his garden trap at Orton Waterville on the south side of Peterborough: two on 5.vi.2010, followed by singletons on 12.vi and 7.vii and 11.vii.2010, all confirmed by PW. An illustrated exhibit was also provided detailing recent survey work on *Athetis pallustris* (Hübn.)

in Lincolnshire, including the finding of larvae in a new part of one of the known breeding localities.

British microlepidoptera

Beavan, Miss S. D. – Two specimens of *Infurcitinea captans* (Gozmány), from Kynance Cove, West Cornwall (VC1) SW6813, 23.vi.2010. An unusually early record for this species. The previous earliest record of an adult was a fresh specimen taken on 6 July. *Caloptilia falconipennella* (Hübn.), Zeal Monachorum, North Devon SS719039 (VC4) 10.iv.2010 at light, new to VC4. *Parornix loganella* (Stainton), Loch Droma, West Ross NH2774 (VC105), larvae on *Betula nana* 15.ix.2009, moth reared 11.v.2010, species identity confirmed by genitalia determination. Apparently the first record of this species being reared, in the British Isles, from *Betula nana*. *Argyresthia dilectella* Zeller, Zeal Monachorum, North Devon SS719039 (VC4) 18.vii.2010 at light, new to VC4. *Agonopterix carduella* (Hübn.), Little Orme, Caernarvon SH8182 (VC49), larvae on *Cirsium* sp. 03.vii.2010, moth reared 23.vii.2010, and from Bryn Pydew, Caernarvon SH8179 (VC49) larvae on *Centaurea nigra* 30.vi.2010, moth reared 07.viii.2010. *Agonopterix curvipunctosa* (Haworth), Steart, South Somerset ST2645 (VC5) larvae on *Anthriscus sylvestris* 04.vi.2010, moth reared 01.vii.2010. A previously unrecorded site for this species which, in the last 40 years, has only been recorded from four other sites and only one of those in the West Country, also in VC5, with the other three in the South and East. Reports of its extinction are, therefore, somewhat premature. (Natural England: *Lost Life – England's lost and threatened species*, 2010.). *Pancalia leuwenhoekella* (L.), Thurlbear, South Somerset SS2721 (VC5) larvae in roots and a few in tubes attached to the roots of *Viola hirta* 23.viii.2010, moth reared 24.ix.2010. Apparently the first record of the larvae found in the wild in the British Isles since 1889 and probably the first record of the larvae being found within the roots. *Philedone gernigana* (D. & S.), Anstey Money Common, North Devon SS8929 (VC4) 12.vii.2010, new to Devon. *Olethreutes arbutella* (L.), Raasay, North Ebudes NG5747 (VC104) larvae on *Arctostaphylos uva-ursi* 20.iv.2010, moth reared 20.v.2010, apparently not previously recorded on the island. *Epinotia nemorivaga* (Tengström), Raasay, North Ebudes NG5747 (VC104) larvae on *Arctostaphylos uva-ursi* 20.iv.2010, moth reared 06.v.2010. Apparently not previously recorded on the island.

Beavan, Miss S. D. & Heckford, R. J. – *Plutella haasi* Staudinger, five specimens reared from larvae found on *Arabidopsis petraea,* at the following localities on the following dates: Beinn Eighe, West Ross (VC105) on 11.ix.2009, moth reared 20.ii.2010; Trotternish Ridge, Isle of Skye, North Ebudes (VC104) on 16.ix.2009, moth reared 26.ii.2010; Trotternish Ridge, Isle of Skye on 18.iv.2010, moth reared 11.v.2010; Blaven, Isle of Skye on 21.iv.2010, moth reared 18.v.2010 and Trotternish Ridge, Isle of Skye on 18.v.2010, moth reared 4.vi.2010. Also exhibited were seven photographs, one of a larva, two of larval feedings and four of habitats, three showing the habitats at Beinn Eighe and Skye and the fourth at a locality on Mull, Mid Ebudes (VC103) where larvae were found on 12.ix.2010. Although moths have not yet been reared from the Mull larvae, they appear identical to those from the other localities. Until 2009 *P. haasi* was only known in the British Isles from one specimen collected on 11.vii.1954 at Beinn Eighe at 830m. On 5.vii.2009 RJH disturbed five moths, one being retained as a voucher, from *Arabidopsis petraea* at Beinn Eighe at 830m. In mainland Europe the species is only known from six localities, five in Norway and one in Sweden. As far as we are aware the larva has not been found in either country, although in Norway the moths are associated with

Draba dovrensis Fr. on dry soil and *Arabis alpina* L. in moist places. Specimens of *P. xylostella* (L.) and *P. porrectella* (L.) exhibited for comparison.

Gynnidomorpha permixtana (D. & S.), Braunton Burrows, North Devon (VC4) 22.viii.2009 larvae in seedpods of *Rhinanthus minor* and *Odontites vernus*, moths reared from both host plants were exhibited. This is apparently the first British record of the species being reared from *Rhinanthus minor*; 18.viii.2010, one of several adults flying early evening and on the same day in the same area that seedpods of *Rhinanthus minor* and *Odontites vernus* were collected from which moths resulted and two reared from *Rhinanthus minor* on 30.ix.2010 and 10.x.2010 were exhibited.

BLAND, K. P. – Interesting Scottish records for 2010. *Phyllocnistis unipunctella* (Stephens), Lennoxlove House, NT5171, East Lothian (VC82), coll. 25.vii.2010, emerged viii.2010, second Scottish record and first confirmed Scottish breeding. *Monochroa cytisella* (Curtis), Auchenmeanach shore, Skipness, NR8856, Kintyre (VC101), 26.vi.2010, one swept from bracken, *Pteridium*, in which old larval galls had been seen, new VC record and most northerly record. *Mompha langiella* (Hübn.), Hopetown House, NT0978, West Lothian (VC84), coll. 20.vi.2010, emerged 17.vii.2010, reared from leaf-mines in *Epilobium* sp. indet., new VC record, though thinly scattered over SE Scotland. *Phlyctaenia coronata* (Hufn.), Chippermore Point NX293477, Wigtownshire (VC74), 23.vii.2010 at mv light, leg. Richard & Barbara Mearns, new VC record, previously recorded only from VC76 and VC77.

BUTCHER, A. G. J. – *Celypha lacunana* (D. & S.), South Blean, East Kent (VC15) 31.v.2009, at mv light, extreme form probably referable to f. *rooana* (Degraaf) (Exhibited last year as *Olethreutes mygindiana* (D. & S.), but since det. gen. P.Jewess)

CLIFTON, J. – *Barea asbolaea* (Meyrick) (Plate 11, Fig. 10), Penzance, SW4630 approx., West Cornwall (VC1), leg. L. Oakes & H. Oakes. An example of this oecophorid described as new to the British Isles in *Ent. Rec.* **122**: 185-190 by Oakes *et al.*. The earliest example has been traced to 2004, but it is now quite common at this site.

COOK, R. – *Assara terebrella* (Zincken), Ferndown, SU0700 approx., Dorset (VC9) 7.x.2010, mv trap; *Donacaula mucronellus* (D.& S.), Emer Bog SU3921, South Hampshire (VC11), 27.vi.2010 at dusk; *D. mucronellus*, Leckford, SU33, North Hampshire (VC12), 9.vii.2010, captured at mv light.

ELLIOTT, B. – *Blastobasis vittata* (Wollaston) (Plate 11, Fig. 11), Sandy Point, Hayling, SZ7498, South Hampshire (VC11), 19.ix.2009, with *B. adustella* Walsingham and *B. rebeli* Karsholt & Sinev for comparison. This species was described as new to the British Isles by the exhibitor and appears to be established. *Semioscopis steinkellneriana* (D. & S.), bred from larva found on *Malus sylvestris*. *Prays oleae* (Bernard), a few early mines on imported olive shrubs were seen in spring in garden centres in Hampshire, from which the two exhibited were bred. *Glyphipterix haworthana* (Stephens), numerous imagines bred from *Eriophorum* heads picked in the winter in the New Forest. *Acleris rufana* (D. & S.), some forms bred from *Myrica gale*, Inverness-shire. *Epinotia crenana* (Hübn.), one bred from a spinning on *Salix cinerea* on high moorland, Inverness-shire. *Aethes hartmanniana* (Clerck), a few seen on Portsdown, South Hampshire (VC11) this year. *Apotomis lineana* (D. & S.), a few imagines bred from *Salix alba* in Cambridgeshire this year. *Neofriseria singula* (Staudinger), a few bred from tubes around the bases of *Rumex acetosella* in Hertfordshire. *Pseudopostega crepusculella* (Zeller), examples from a colony found in the middle of Letchworth, Herts. Adult of *Eulamprotes wilkella* (L.), from a colony on the dunes at St Helens, Isle of Wight, still flourishing despite heavy trampling by visitors.

HALL, N. M. – *Oncocera semirubella* (Scopoli), Bozedown, Whitchurch-on-Thames, Oxfordshire (VC23), 7.viii.2010, one of five seen; Greenham Common,

Berkshire (VC22), two of five seen on 7.x.2010. There have been only four previous records for VC22, including one at Greenham Common. *Pempelia genistella* (Duponchel), Padworth Common, Berkshire (VC22), 13.vii.2010; Crookham Common, Berkshire (VC22), 5.viii.2010, these were new for each site, and are the third and fourth records for VC22. *Mecyna flavalis* ssp. *flaviculalis* Caradja, Bozedown, Whitchurch-on-Thames, Oxfordshire (VC23), 2 of 32 recorded at the Bozedown Local Wildlife Site on 27.vii.2010 by day, and 2 of 45 recorded, mostly at the Local Wildlife Site, on 7.viii.2010 at mv. The nearby colony at Hartslock Nature Reserve, Goring-on-Thames is well known, but the existence of such a strong colony at Bozedown was previously unknown.

HECKFORD, R. J. – *Ectoedemia heckfordi* Van Nieukerken, Latùvka & Latùvka, Hembury Woods, South Devon (VC3) larvae mining leaves of *Quercus petraea* 5.ix.2004, two moths reared 15 & 22.v.2005, together with an exhibit showing mined leaves and a photograph of a mine with a larva (taken by Mr I.Thirlwell) and a reproduction of a watercolour of an adult (drawn by Mr. A. Latùvka). The species was described by Van Nieukerken, Latùvka & Latùvka in 2010 in a paper on Western Palaearctic *Ectoedemia* species (*ZooKeys* **32**: 1–82), and the exhibited photograph and watercolour were used in that paper. Both the exhibited moths are paratypes. Currently the species is known from only four 1 km squares in South Devon and nowhere else in the world. New both to the British Isles and science. *Incurvaria masculella* (D. & S.), Muckle Heog, Unst, Shetland (VC112) 15.vi.2010 four of several adults (confirmed by genitalia examination) all with a wingspan of about 12 mm found on serpentine heath; not only are these on average smaller than mainland specimens whose wingspans are usually between 12-16 mm, but also the usual larval foodplants in the British Isles are deciduous trees and bushes, especially *Crataegus* and *Rosa* spp. but these were absent from the locality; two from Devon shown for comparison. *Rhigognostis annulatella* (Curtis), East Neap, Fetlar, Shetland (VC112) larvae on *Cardamine hirsuta* 12.v.2010, moths reared 9–11.vi.2010; Blaven, Isle of Skye, North Ebudes (VC104) larva on *Arabidopsis petraea* 21.iv.2010, moth reared 27.v.2010. Prior to this, in the British Isles the only known foodplant was *Cochlearia officinalis* and the species had only been recorded in coastal localities, generally on rocky coasts, but Blaven is a mountain just over 3 km from the coast. *Platyedra subcinerea* (Haworth), Budleigh Salterton, South Devon (VC3) larvae in seeds of *Malva sylvestris* 18.vii.2010, moths reared 13 & 16.viii.2010. Apparently only the second Devon locality and the first Devon record for about 130 years. *Pancalia schwarzella* (Fabr.), Coll, Mid Ebudes (VC103) near Tràigh Gharbh larvae in tubes feeding on leaves of *Viola canina* 27.vi.2009, moths reared 12 & 14.iii.2010; Coll, near Tràigh Chrossapol, larvae in tubes feeding on leaves of *Viola canina* 28.vi.2009, moths reared 8 & 20.iii.2010, new to VC103. *Acleris logiana* (Clerck), on outside of Sainsbury's, Marsh Mills, Plymouth, South Devon (VC3) 9.xii.2009, new to Devon. *Acleris umbrana* (Hübn.), Ringmore, South Devon (VC3) larva in spun leaves of *Prunus spinosa* 21.x.2010, moth reared 29.x.2010. *Olethreutes arcuella* (Clerck), two moths reared on 14 & 19.iv.2010 from ova laid by a female caught on 31.v.2009 at Hembury Woods, South Devon (VC3). Initially the larvae would only feed on very small fragments of dead leaves of *Betula* sp. but later fed on whole dead leaves. They went into hibernation in August and commenced feeding again in the spring. Possibly not previously reared in the British Isles. *Olethruetes schulziana* (Fabr.), Beinn Eighe, West Ross (VC105), larvae in tubes amongst *Empetrum nigrum* 15.ix.2009, moths reared 2 & 11.v.2010; Beinn Eighe, West Ross (VC105), larva in tube amongst *Calluna vulgaris* 15.ix.2009, moth reared 27.iv.2010; Coire Beinn Dearg, Easter Ross (VC106), larva in tube amongst *Empetrum nigrum* 16.v.2010,

moth reared 3.vi.2010. Apparently the first time that the larva has been found in the British Isles and *Empetrum nigrum* is not a foodplant given in mainland European literature. *Agriphila straminella* (D. & S.), Little Heog, Unst, Shetland (VC112), larvae at base of *Carex flacca* 14.v.2010, 2 ♀♀ reared 15 & 19.vi.2010 with a wingspan of 11–12mm and the forewing produced towards the apex, the usual wingspan being between 16–23mm and the forewing not produced towards the apex, together with specimens from Devon for comparison. *Eudonia alpina* (Curtis), near Lingness, Mainland, Shetland (VC112) 16.vi.2010, three specimens all with the ground colour of the forewing very pale grey and the antemedial and postmedial fasciae obsolete in two specimens but black in the third. *Platyptilia calodactyla* (D. & S.), Lyn Valley, North Devon (VC4) pupa in crown of aborted stem of *Solidago virgaurea* 1.vi.2010, moth reared 9.vi.2010.

HENWOOD, B. – *Eriocrania chrysolepidella* Zeller, Orley Common, Ipplepen, SX8266, South Devon (VC3), larva on *Corylus avellana* 10.v.2009, bred 12.iv.2010; *Epinotia demarniana* (Fischer von Röslerstamm), Ideford Common, SX9078, South Devon (VC3), 2.vii.2010, mv light; *Ancylis tineana* (Hübn.), Edendon Bridge, north of Pitlochry, NN7170, East Perth (VC89), 22.v.2010, netted by day; *Prolita sexpunctella* (Fabr.), near Dalwhinnie, Easterness, NN6384 approx., East Inverness-shire (VC96), 26.v.2010.

KNILL-JONES, S. A. – Moths from Isle of Wight (VC10): *Perinephela lancealis* (D. & S.), 9.vi.2010; *Aphomia sociella* (L.), 10.vii.2010; *Celypha striana* (D. & S.), 1.vii.2010; *Epiblema foenella* (L.), 19.vii.2010; *Phalonidia manniana* (Fischer von Röslerstamm), 8.ix.2010; *Cydia amplana* (Hübn.), 18.viii.2010; *Diurnea fagella* (D. & S.), 20.iii.2010; *Pyrausta despicata* (Scopoli), 21.vi.2010; *Phlyctaenia perlucidalis* (Hübn.), 28.vi.2010; *Phycita roborella* (D. & S.), 19.viii.2010; *Epinotia bilunana* (Haworth), 17.vi.2010, new to VC; *Ostrinia nubilalis* (Hübn.), 24.vii.2010 and 4.ix.2010; *Evergestis extimalis* (Scopoli), 9.ix.2010.

LANGMAID, J. R. – *Stigmella aeneofasciella* (Herrich-Shäffer), Newdigate TQ1942, Surrey (VC17), a series of four bred from *Agrimonia eupatoria*, mines collected 10.x.2009, moths emerged April 2010. Surely one of the most beautiful of British moths. *Prays oleae* (Bernard), Bryngwyn SO3909 approx., Monmouthshire (VC35), two specimens bred from *Olea europaea* from a garden centre, new county record. *Coleophora frischella* (L.), Ffrwdrech SO0327 approx., Breconshire (VC42) 28.v.2010, one of six swept from *Trifolium pratense*, determined by examination of the genitalia of another taken at the same time. New county record. *Blastobasis vittata* (Wollaston), the garden of Mr Derek Lee at Bracklesham Bay, SZ8195 approx., West Sussex (VC13) two, 18.viii.2010 and Southsea, SZ6598, South Hampshire (VC11), 26.vii., 9.ix. and 16.ix.2010. *Phalonidia gilvicomana* (Zeller), Hen Wood SU6522, South Hampshire (VC11), larvae found 13.viii.2009, emerged May 2010, new to Hampshire. *Acleris comariana* (Lienig & Zeller), Cors y Llyn NNR, SO0155, Radnorshire (VC43), larvae collected 2.viii.2010, emerged later the same month, a series of four showing different forms, new county record. *Grapholita lobarzewskii* (Nowicki), Milton Common, Portsmouth, SU6700, South Hampshire (VC11), larvae collected 27.vii.2009, emerged late May to early June 2010, believed to be the first rearing of the species in Britain. *Cydia pomonella* (L.), Southsea, SZ6598, South Hampshire (VC11), 1.vii.2010, a remarkable aberration with the whole of each forewing basad of the ocelli plain silvery grey. *Chrysoteuchia culmella* (L.), Lytham St Anne's, SD32, West Lancashire (VC60) 23.vi.2010, an albino specimen. *Udea fulvalis* (Hübn.), Southsea, SZ6598, South Hampshire (VC11), 23.vii.2010. *Diplopseustis perieresalis* (Walker), Southsea, SZ6598, South Hampshire (VC11), 27.vii.2010, at rest this species looked like an oversized choreutid and it was

very skippy, new to Hampshire. *Agrotera nemoralis* (Scopoli), Southsea, SZ6598, South Hampshire (VC11), 4.vi.2010, mv light, second Hampshire record. *Aphomia zelleri* (Joannis), Southsea, SZ6598, South Hampshire (VC11), 21.vii.2010, a pristine specimen taken at mv light, new to Hampshire.

MASTERS, I. D. – *Palpita vitrealis* (Rossi), Middleton-on-Sea, SU982004, West Sussex (VC13), 24.vii.2010, new to site; *Crambus hamellus* (Thunberg), Owlsmoor, Sandhurst, SU851624, Berkshire (VC22), 22.viii.2010, to actinic light-trap, one of few records from Berkshire.

MCCORMICK, R. – *Cameraria ohridella* Deschka & Dimik, this has now arrived in North Devon (VC4), Knowle, near Braunton, 31.vii.2010, leg. P. Goodwin & P. Wilson, a row of trees infested. *Pseudatemelia josephinae* Toll, Warleigh Point DWT Reserve near Tamerton Foliot, SX4560, S.Devon (VC3), 19.vi.2010, at light, last seen in VC3 in 2007. *Palpita vitrealis* (Rossi), Exminster Marshes, Lions Rest, SX9587, South Devon (VC3) 30.vi.2010, at light, leg. Nigel Pinhorn, one of few migrant records this year.

PLANT, C. W. – *Diaphania perspectalis* (Walker), Bishop's Stortford, TL4921 approx., Hertfordshire (VC20), 8.viii.2010, leg. J.Fish & J.Reeves, in coll. C.W.Plant. Apparently the fifth British record of an adult. See *Ent. Rec.* **122**: 203–204.

ROUSE, T. – *Diaphania perspectalis* (Walker), Densole, TR2141, East Kent (VC15), 13.vii.2010, mv light.

SIMS, I. – *Ectoedemia sericopeza* (Zeller), Lower Earley, Reading, Berkshire (VC22), 6.vii.2010, larva in *Acer pseudoplatanus*, emerged 21.vii.2010, adult, cocoon & mined key, new to VC22; *Triaxomasia caprimulgella* (Stainton), Lower Early, Reading, Berkshire (VC22), 24.vi.2010, to light; *Monopis laevigella* (D. & S.), Dinton Pastures, Hurst, Reading, Berkshire (VC22), 25.vi.2010, larvae in owl pellets, emerged 4.ix.2010, adults, pupae and larval feeding site; *Caloptilia leucapennella* (Stephens), Jealott's Hill, Berkshire (VC22), 25 & 29.ix.2010, beaten from Leyland cypress; *Metriotes lutarea* (Haworth), Jealott's Hill, Berkshire (VC22), 1.vi.2008, larva on *Stellaria holostea*, bored into oak bark 10.vi.2008, over-wintered in shed, emerged 19.v.2009, adult, larval case and pupation site exhibited; *Coleophora juncicolella* Stainton; Hainault Forest, Chigwell Row, South Essex (VC18), 2.vi.2010, netted; same site, 10.iv.1999, cases swept from *Calluna vulgaris*; *Diurnea lipsiella* (D. & S.), Dinton Pastures, Hurst Reading, Berkshire (VC22), 29.x.2009, dusking; *Altenia scriptella* (Hübn.), Hurst, Reading, Berkshire (VC22), 9.ix.2009, larva on *Acer campestre*, emerged 2.iv.2010, adult and larval feeding exhibited; *Cosmopterix zieglerella* (Hübn.), Hurst, Reading, Berkshire (VC22), 21.viii.2008, larva mining *Humulus lupulus*, kept indoors over winter, emerged 11.i.2009; *Eana incanana* (Stephens), Jealott's Hill, Berkshire (VC22), 28.iv.2010, larvae in *Hyacinthoides non-scriptus*, emerged 28.v.2010, a total of about 50 adults reared but no parasitoids, adults, larval feeding and pupae exhibited; *Pammene regiana* (Zeller), Warburg, Bix, Oxfordshire (VC24), 24.xi.2000, larvae under bark of *Acer pseudoplatanus*, 24.xi.2000, pupated 30.iv.2001, emerged 12.v.2001, adults and cocoon exhibited; *Pammene trauniana* (D. & S.), Dinton Pastures, Hurst, Reading, Berkshire (VC22), 10.vii.2009, to mv; *Pammene aurana* (Fabr.), Hurst, Reading, Berkshire (VC22), 2.vii.2010, around *Heracleum sphondylium* flowers at 17.10 hours; *Sitochroa palealis* (D. & S.), Jealott's Hill, Berkshire (VC22), 28.vii.2010, netted at 13.00 hours; *Duponchelia fovealis* Zeller, Lower Earley, Reading, Berkshire (VC22), 4.ix.2010, to light.

SIMPSON, A. N. B. & WADSWORTH, O. – *Phyllonorycter comparella* (Duponchel), Worcester City and environs, Worcestershire (VC27), 24-29.ix.2010, imagines, pupa and mine bred from *Populus nigra*; Castlemorton Common, Worcestershire (VC27)

28.ix.2010, from *P. nigra, P.* × *canescens* and *P. alba.* First VC37 record since 1878. *Phyllonorycter sagitella* (Bjerkander) for comparison, Deerfold Wood, Worcestershire (VC27) 25.ix.2010, imagines pupa and mine, bred from *P. tremula*, in one of its previously known sites, exhibited for J. R. Rush.

THIRLWELL, I. R. – *Blastobasis vittata* (Wollaston), Portsmouth SU6700 (VC11), trapped on several dates in 2010, exhibited with *B. adustella* Walsingham for comparison.

WHEELER, P. R. – Notable species found in Surrey (VC17). *Ectoedemia quinquella* (Bedell), emerged 3 & 5.vi.2007 from mines in oak collected 5.xi.2006 at Fish pool, Chobham, SU993633; *Psychoides verhuella* Bruand, Silent Pool, TQ059483, emerged 1.vi.2010 from Harts-tongue fern collected 24.iv.2010; *Monopis imella* (Hübn.), Chobham garden, SU977625, 5.xi.2005, to mv; *Niditinea fuscella* (L.), Chobham, SU977625, indoors 19.vi.2005; Godalming, 29.v.2007, leg. Valerie Searle, det. PRW; *Phyllonorycter dubitella* (Herrich-Schäffer), Horsell Birch, SU985602, mines in broad-leaved *Salix* emerged 15.iv.2008 and 5.iv.2009; *Phyllonorycter anderidae* (Fletcher), Chobham Common SU975635, mines 2.xi.2009 in birch seedlings recolonising after a major fire, emerged 10.iv.2010; *Phyllonorycter quinqueguttella* (Stainton), Horsell Birch SU986599, mines in *Salix repens* 21.vii.2008, emerged 27.vii.2008; *Orthotaelia sparganella* (Thunberg), Shalford Meadows, SU998473, 23.vii.2008, to mv; *Epermenia falciformis* (Haworth), Bookham Common, TQ125563, 12.vi.2009, to mv; *Metriotes lutarea* (Haworth), Chobham Common SU977631, 6.v.2005; SU977631 4.v.2006, noted by day; *Coleophora sternipennella* (Zetterstedt), Chobham Garden, SU977625, 19.vii.2006 & 4.viii.2009, both gen.det., the exhibitor records one or two per year here; *Elachista maculicerusella* Bruand, Shalford Meadows, SU998473, 23.vii.2008, to mv; *Elachista subocellea* (Stephens), Hackhurst Downs, TQ094485, 12.vi.2009; *Crassa tinctella* (Hübn.), Bookham Common, TQ124564, 11.vi.2010, to mv; *Semioscopis steinkellneriana* (D. & S.), Ottershaw TQ005642, 26.iv.2006, to Heath trap; Chobham Garden SU977625, 23.iv.2005, to mv; *Ethmia dodecea* (Haworth), Norbury Park, TQ158528, 27.vi.2008, to mv; *Metzneria neuropretella* (Zeller), Pewley Down, TQ007489, 29.vii.2010, to mv, first county record since 1894; *Stenolechia gemmella* (L.), Chobham Common, SU977633, 23.viii.2005, to mv; *Pseudotelphusa scalella* (Scopoli); Chobham garden, SU977625, 7.vi.2004; *Teleiodes paripunctella* (Thunberg), Chobham Common, SU977633, 6.vi.2005, to mv and SU974631, 7.vi.2009; *Carpatolechia fugitivella* (Zeller), Nonsuch Park, TQ234633, 12.vi.2006, to mv, two detd. gen.; *Chionodes distinctella* (Zeller) Chobham Common, SU965662, 11.viii.2005, to Heath trap in a bomb crater, gen. det. GA Collins, first county record since Victoria County History; *Mompha sturnipennella* (Treitschke), New Haw, TQ040633, 22.vii.2008 galls in Rosebay on neglected land, emerged 9.viii.2008; *Scythris grandipennis* (Haworth), Chobham Common, SU977634, 23.vi.2006, to mv; *Scythris limbella* (Fabr.), Chobham garden SU977625, 13.vii.2007, to mv, only one in 10 years; *Phalonidia manniana* (Fischer von Röslerstamm), Shalford Meadows, SU998473, 23.vii.2008, to mv; *Aethes dilucidana* (Stephens), Newlands Corner, TQ042490, 4.vii.2010, to mv; *Acleris logiana* (Clerck), Chobham Common, SU980641, 1.vii.2008, to mv and SU977633 11.x.2005 to mv; *Acleris hyemana* (Haworth), Lamps Moss, NY814044, North Yorkshire (VC65), 19.iii.2005, by day; *Pseudosciaphila branderiana* (L.), Bookham Common, TQ128560, 11.vi.2010, to mv; *Apotomis sororculana* (Zetterstedt), Ralia, NN699968, East Inverness-shire (VC96), 25.v.2007; *Lobesia littoralis* (Humphreys & Westwood), New Haw garden, TQ047625, 26.viii.2009, leg. Tony & Carol Beasley, det. PRW; *Eudemis porphyrana* (Hübn.), Headley Heath, TQ204532, 22.viii.2006, to mv; *Ancylis unguicella* (L.), Chobham Common,

SU965647, 25.v.2005, to Heath trap; *Ancylis apicella* (D.&S.), Norbury Park, TQ165539, 2.vi.2007, to mv; *Blastesthia posticana* (Zetterstedt), Chantry Wood, TQ007483, 4.v.2009, to mv; *Blastesthia turionella* (L.), Chantry Wood, TQ007483, 4.v.2009, to mv; *Crambus hamella* (Thunberg), Folly Bog, SU927612, 6.ix.2007, to mv; *Oncocera semirubella* (Scopoli), Juniper Bottom, Box Hill, TQ177527, 21.vii.2006, to mv; *Pempelia genistella* (Duponchel), Chobham Common, SU965641, 15.vii.2007, to mv; Chobham Common, SU974632, 23.vii.2003, to mv; *P. obductella* (Zeller), Pewley Down, TQ007489, 25.vii.2007 and 29.vii.2010; *P. formosa* (Haworth), Chobham garden, SU977625, 3.vii.2003, to mv; *Assara terebrella* (Zincken), Chobham garden SU977625, 5.vi.2010 and 27.vii.2010, to mv; *Apomyelois bistriatella* (Ragonot), Chobham Common, SU975635, 13.vii.2009, to Heath trap near abundant *Daldinia* after major fire; *Buckleria paludum* (Zeller), Chobham Common, SU974635, 7.vi.2008, to a 'Moonlander' trap.

Channel Islands lepidoptera

Sterling, P. H. & Costen, P. D. M. – Examples of Southern Grass Emerald, *Chlorissa cloraria* (Hübn.) (Plate 11, Fig. 9), from Guernsey, and Small Grass Emerald, *Chlorissa viridata* (L), from England. It is likely that all historical records of *C. viridata* from the Channel Islands are referable to *C. cloraria*. Key differences in wing colour, wing pattern, male genitalia and last instar larva were illustrated.

Foreign lepidoptera

Corley, M. F. V. – New and interesting Lepidoptera from Portugal. Continuing on the theme of 2009 the exhibit consisted mostly of species that are restricted to some of the northernmost mountains of Portugal, Serra do Gerês and Serra de Montesinho. These are often Euro-Siberian species reaching their south-western limit in North Portugal. (1) Serra do Gerês is sufficiently close to the Atlantic to have high rainfall and a somewhat limited difference between winter and summer temperatures. Consequently many of the species restricted to this region are familiar British species. *Polia nebulosa* (Hufn.), *Diarsia brunnea* (D.&S.), *Lacanobia thalassina* (Hufn.) (first genuine Portuguese record), *Hypena crassalis* (Fabr.) and *Abraxas grossulariata* (L.) were exhibited. (2) Serra de Montesinho in the north-east of Portugal has a more continental climate. Although many familiar British species just reach here, the area is also home to species that are rare or absent from Britain. *Adela croesella* (Scop.) (second Portuguese record), *Siona lineata* (Scop.), *Athetis pallustris* (Hübn.) and *Sideridis reticulata* (Goeze) (second Portuguese record) were exhibited, and also a bred specimen of *Achlya flavicornis* (L.), which is very rare in Portugal. (3) Serra da Estrela lies in the north-east of central Portugal. These are the highest mountains of Portugal, falling just short of 2000 m. From here were *Rhyacia simulans* (Hufn.) (second Portuguese record) from the high ground and *Cucullia lanceolata* (Vill.) (formerly *thapsiphaga* Treitschke) from middle altitude. The *Cucullia* is new for Portugal. (4) Some moths collected in Algarve on the coast in late October were also exhibited. *Agrotis boetica* (Ramb.) is a little known species, as is *Eremopola orana* (H. Lucas) (second Portuguese record). Four specimens of *Gortyna* were also exhibited. These appeared to represent two species *G. borelii* (Pierret) and *G. puengeleri* (Turati), but it is surprising that at one site both appeared together. *Afriberina terraria* (Bang-Haas) has been known from western Algarve for 18 years, but the possibility remains that it may be a misidentification of *A. tenietaria* (Stgr).

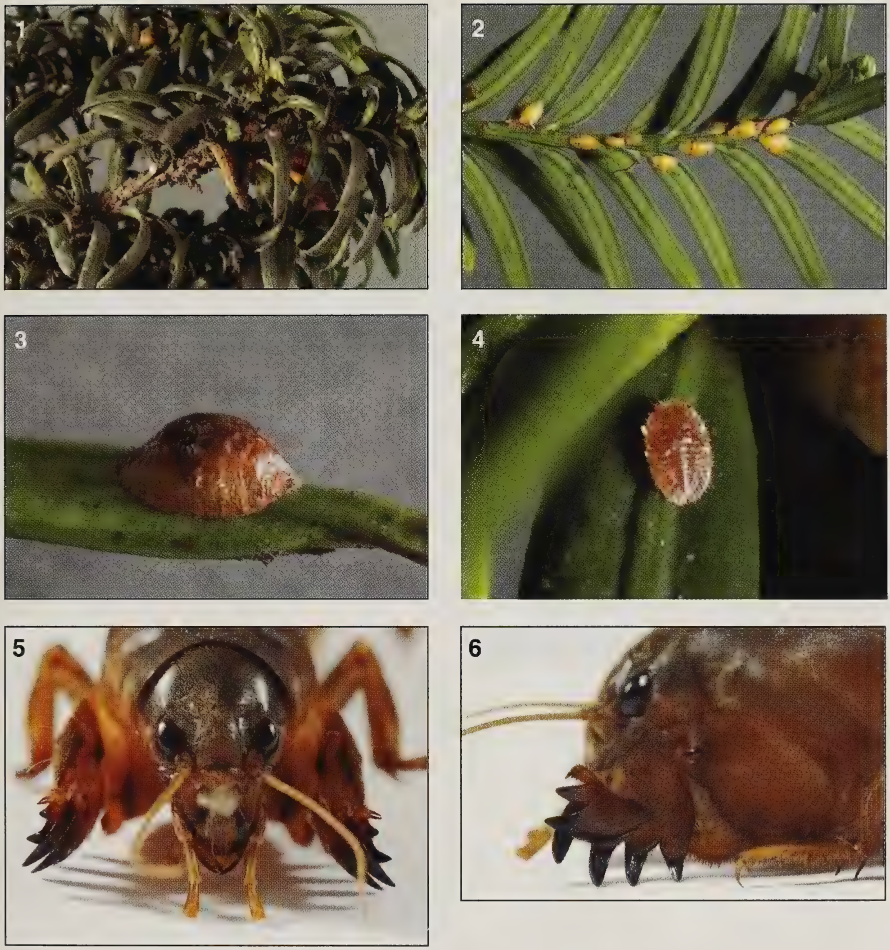


PLATE 9. Figs 1–4. Yew scale *Parthenolecanium pomeranicum.* 1: Scale infested yew covered in honeydew, sooty mould and dirt. 2: Teneral adult females. 3: Close-up of an adult female. 4: Close up of an overwintering second instar female. Figs 5–6. European mole cricket, *Gryllotalpa* sp. 5: Head, frontal view. 6: Head and thorax, lateral view showing modified fore-legs. © Fera.

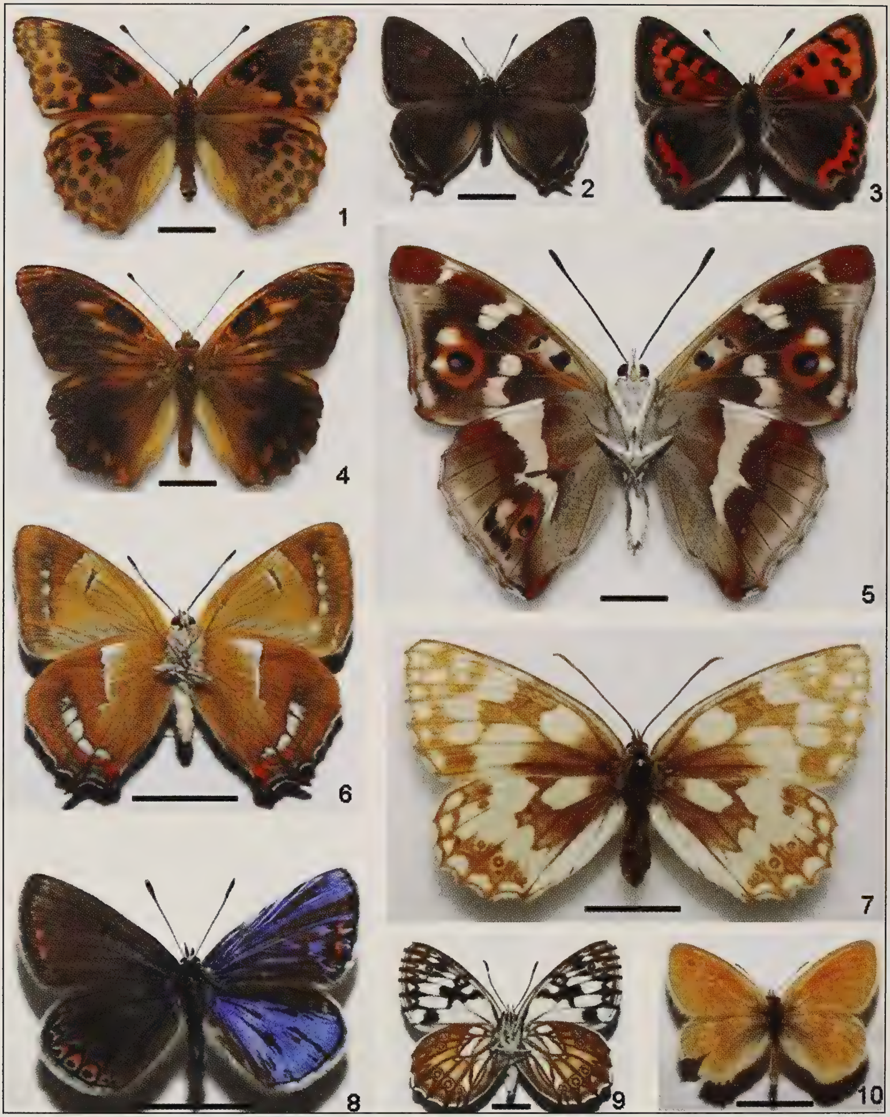


PLATE 10. 1: *Argynnis paphia*, bred K. E. J. Bailey. 2: *Thecla betulae*, bred 10.vii.2010, A. L. Butler. 3: *Lycaena phlaeas* gynandromorph, bred 2010, P. Tebbutt. 4: *Argynnis paphia* ab. *nigricans*, Sussex, 2010, A. Batten. 5: *Apatura iris*, showing homoeosis, bred K. E. J. Bailey. 6: *Thecla betulae*, bred from cool-shocked pupae, 2010, P. Tebbutt. 7: *Melanargia galathea* ab. *rubra*, Sussex, 2010, A. Batten. 8: *Polyommatus icarus* gynandromorph, bred 2010, A. M. Jones. 9: *Melanargia occitanica* ab. *huebneri*, Var, France, 14.v.2010, J. W. Phillips. 10: *Coenonympha pamphilus* ab. *detersa*, Weston on Portland, Dorset, 8.ix.2009, M. Parker.
Scale bars: 10 mm

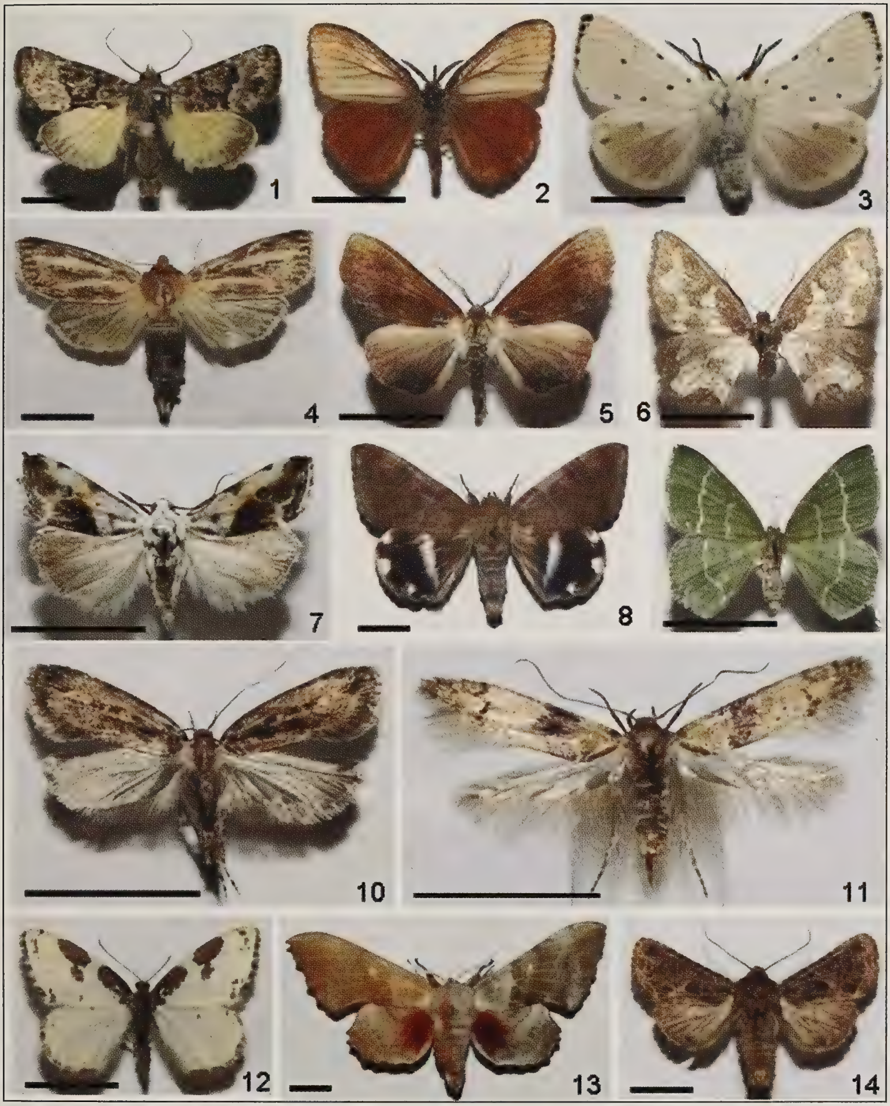


PLATE 11. 1: *Thalpophila matura*. Bozedown, Oxfordshire, 7.viii.2010, N. M. Hall. 2: *Orgyia antiqua*, Kent, 2010, T. Rouse. 3: *Diaphora mendica* f. *rusticata*, Lough Carragh, Co. Kerry, 27.v.2010, J. H. Clarke. 4: *Archanara sparganii*, Portholland, Cornwall, 19.ix.2009, I. Reid. 5: *Plagodis dolabraria*, Canterbury, Kent, 2010, J. Platts. 6: *Lomaspilis marginata*, Canterbury, Kent, 2010, J. Platts. 7: *Acontia candefacta*, Svet Nikola, Bulgaria, 13.ix.2010, C. W. Plant. 8: *Achaea janata*, ex pomegranate, Crawley Down, West Sussex, J. H. Clarke. 9: *Chlorissa cloraria*, Guernsey, 2010, P. H. Sterling and P. D. M. Costen. 10: *Barea asbolaea*, Penzance, West Cornwall, 2010, J. Clifton. 11: *Blastobasis vittata*, Hayling, South Hampshire, 19.ix.2009, B. Elliott. 12: *Lomaspilis marginata*, Lough Carragh, Co. Kerry, 27.v.2010, J. H. Clarke. 13: *Laothoe populi* gynandromorph, Portsmouth, Hampshire, 19.vii.2010, I. Thirlwell. 14: *Hadena bicruris*, Middleton-on-sea, Sussex, 20.vi.2009, I. D. Masters.
Scale bars: 10 mm, except 11 (5 mm).

PLATE 12. 1: *Dryinus collaris*, Windsor Forest, Berkshire, 22.v.2010, K. & R. Merrifield. 2: *Zaraea aenea*, reared from larva, Croydon, Surrey, emerged 2.iv.2010, R. D. Hawkins. 3: *Xiphydria longicollis*, Knaphill, Surrey, 3.vii.2010, A. J. Halstead. 4: *Cimbex connatus*, Fareham, South Hampshire, 27.vii.2010, R. J. Dickson. 5: *Acantholyda erythrocephala*, near Wisley, Surrey, 14.v.2010, A. J. Halstead. 6: *Peyerimhoffina gracilis*, Chigwell Row, South Essex, 2.xi.2010, C. W. Plant. 7: *Conostethus venustus*, Rotherham, South Yorkshire, 31.v.2010, J. Flanagan. 8: *Macropsis megerlei*, Morfa Harlech, north Wales, 5.vii.2010, T. Bantock. 9: *Meloe brevicollis*, Baigh nan Trailleich, Coll, 25.v.2010, D. Mann.
Scale bars: 1–6, 9, = 5 mm; 7–8 = 1 mm.

HALL, N. M. – 'Leisure' moth trapping on the Canary Islands. The exhibit showed examples of moths attracted to light within apartment complexes in holiday resorts on the Eastern Isles (Fuerteventura, Lanzarote and Gran Canaria) between November and April in several different years. The species found there are mostly Palaearctic rather than Ethiopian species, despite the proximity to Africa, and should look at least 'vaguely familiar' rather than 'exotic' to any UK lepidopterist. The flora and fauna of all the Eastern Isles are similar. NMH has never collected on the Western Isles (Tenerife, Gomera and La Palma), but would expect to find the same species to be common there, with the possible exception of some Canary endemics, several of which are found only on the Eastern Isles, and others only on the Western Isles. Sometimes he is lucky enough to choose an apartment where there are many low-energy light bulbs around the complex at an accessible height, and with nearby surfaces on which moths can land and settle. When there are many such lamps, they are the main source of specimens, even if an mv light is run outside the apartment. For this purpose he always takes a blended 160W mv bulb, a lead with a continental plug at one end and a bayonet socket at the other, and an aluminium bar with a circular hole for the bayonet socket and screw holes for the lamp-guard. With these, a trap can be improvised using a cardboard box scavenged from a supermarket or a skip. A photograph of the improvised trap used in 2010 was shown. Horizontal slots had been cut in the sides of the box with a Stanley knife for the bar to pass through. The top of the box had been cut to form three flaps on each side, which could be lifted to give access to the inside without fouling the lamp-guard. The central flaps were cut back to allow large moths to find their way into the box round the lamp. Leaving the flaps more or less horizontal, instead of pushing them down in the manner of a Skinner trap as he had usually done before, was very successful because many micros settled on the top and could be examined easily. Though the lamp-guard is designed to protect anyone within range if it explodes, it also protects the bulb from any rain, and protects the moths from the heat of the bulb. The fact that small moths can settle on the mesh of the lamp-guard, rather than trying to settle on the lamp itself, is a great advantage. There may be other problems e.g. with getting the electricity from inside the apartment to outside without leaving the door open, and finding somewhere where the lamp will not disturb the neighbours. Ants and cats can also cause problems at the trap and, if any specimens are retained, the boxes they are put in must be sprayed (in the UK before departure) with a creepy-crawly spray (permethrin/tetramethrin) or they will almost certainly be damaged by ants. Hotel staff have only once asked NMH why he had a bright light on his patio, but their concern was only with safety, and they were reassured by the presence of a lamp-guard.

Anyone trying this for the first time may be surprised to find how few moths come to lights on an average night, especially as the air temperature rarely drops below 16°C. They may also be surprised how small the moths are on average – they are mostly microlepidoptera and Pyralidae. Catches can be particularly poor when the prevailing north-easterly trade winds are blowing. The nights then tend to be clear, the wind may not drop, and the moon may be troublesome. Generally, most moths emerge when the wind has a southerly component, especially during 'La Calima' events when the wind comes from the SE bringing dust-laden air from the Sahara. Nonetheless interesting things can turn up following any very hot day.

Bred specimens shown were: *Chrysodeixis chalcites* Esper, Golden Twin-spot, bred ex female, Parque Golf, Maspalomas, Gran Canaria, 26.iii.2010, F_1 emerging and set last week in May to mid-June 2010. NMH was surprised that the bred specimens were so dark. The males had black scent scales at the tip of the abdomen, visible from

above and below. *Scopula minorata* Boisduval, bred ex female, Parque Golf Apts, Maspalomas, Gran Canaria, 18.iii.2010, $4 \times F_1$ emerging 11–13.v.2010; *Idaea charitata* Rebel, bred ex female, Parque Golf Apts, Maspalomas, Gran Canaria, 19.iii.2010, $6 \times F_1$ emerging 17–27.vi.2010 (banded and unbanded forms).

Other specimens shown were: *Euxoa canariensis* Rebel; *Agrotis trux* Hübner, one of the commonest of the Noctuinae in the Canaries; *A. herzogi* Rebel; *A. aisleitneri* Behounek, G. & Speidel, 2009, the species that NMH found first at Corralejo in November 1997, which was recognised by Martin Honey as an undescribed species at the following BENHS Exhibition. It has now been described formally as *A. aisleitneri* (Type Locality: Cape Verde Islands), but the female is still unknown. NMH has examined more than 100 individuals coming to light, in the hope of finding a female, and has tried sugar ropes and searching walls, but with no success. The species was to be described by Martin Honey and Michael Fibiger (and had been – as *A. correlejoi* [sic] Fibiger & Honey 2004, according to Wikipedia), but this had remained in manuscript awaiting the discovery of the female. *Leucania punctosa* Treitschke; *Cucullia calendulae* Treitschke [syn. *Cucullia hermiguae* Pinker & Bacallado]; *Cucullia syrtana* Mabille; *Polymixis bacheri* Püngeler; *Caradrina aspersa* Rambur; *C. rebeli* Staudinger; *Galgula partita* Guenée; *Condica capensis* Guenée; *Chiasmia aestimaria* Hübner, *Eupithecia boryata* Rebel, a provisional identification based only on illustrations in Báez (1998); *Microloxia simonyi* Rebel [= *Eucrostes simonyi* Rebel]; *Scopula guancharia* Alphéraky; *Idaea vilaflorensis* Rebel; *I. volloni* Lucas & Joannis. The wings of *I. volloni*, are dark and shiny, like those of Spanish *I. saleri* and *I. carvalhoi*, but they are grey rather than black, and longer. *Idaea volloni* males, however, have unspecialised hind legs with terminal tibial spurs; *I. abnorma* Pinker, a sister species of *I. longaria* H.-S., (the two are not sympatric). NMH has bred it from Fuerteventura, believing it to be *I. longaria* at the time. *Cornifrons ulceratalis* Lederer (Pyralidae, Evergestinae), which is placed in its own genus (rather than *Evergestis*) because of a triangular projection on the frons. Strongly marked specimens can have a very clear subterminal band. Whether the pattern is strong or not, there are often two small spots on the more dorsal major fold-line in the wing and in resting position the folded hindwing is sometimes just visible exactly there, and the spots can give the false impression that the hindwing is more heavily marked than it is. The resting position is normally a steep inverted 'V' and it can be difficult to spread the wings of a specimen, for example to pin it into Plastazote. Fresh specimens may not be fully hardened, even after coming to light, and can be much easier to spread. They can also adopt a much flatter resting position.

Meredith, S. L. – Tropical (South American) Lepidoptera. A specimen of a clearwing skipper, *Oxynetra confusa* Staudinger and the remains of another species not identified due to breaking up.

Phillips, J. W. – *Melanargia occitanica* ab. *huebneri* Oberthur, Western Marbled White (Plate 10, Fig. 9), a named aberration exhibiting virtual total brown suffusion to the underside hindwing, taken at Chaume, nr Vidauban, Var, France, on 14.v.2010. (Verified by B. Huertas at the NHM).

Plant, C. W. – Moths of Eastern Europe.

Since 1995, the exhibitor has been studying the moths of Eastern Europe, sometimes accompanied by various friends including, in alphabetical order, Marcel Ashby, Harry Beaumont, Duncan Fraser, Les Hill, Phil Jenner, Tony Pickles and Rachel Terry. Since 2002, efforts have been concentrated primarily upon Bulgaria where resident lepidopterists Stoyan Beshkov and Boyan Zlatkov joined him on most nights. A number of moths were exhibited – more for interest than for any particular scientific reason. These were: Hepialidae: *Hepialus (Triodia) amasina*

(H.-S.), in Europe found only in the Balkans where it flies in August and September, but also present from Asian Turkey eastwards (Bulgaria, Durankulak, 14.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); Geometridae: *Orthostixis cribrella* (Hübner), a distinctive geometer that sits, taxonomically, at the 'front' of the family with the emeralds. It is a south-eastern species in Europe, extending no further west than Hungary (Bulgaria, Dolni Chiflik: coastal sand dunes, 13.viii.2009, leg. C. W. Plant & S. Beshkov, in coll. C. W. Plant); *Costaconvexa polygrammata* (Borkh.), an extinct British resident, though it sometimes reaches us as an immigrant. It is a wetland species and it has probably declined across Europe in parallel with loss of its habitat. The example shown was taken on dry steppe grassland on the cliff tops by the Black Sea on a "migrant night" (Bulgaria, between Svet Nikola & Balgarevo, coastal cliff terrace grassland, 13.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Docirava (Aplocera) dervenaria* Mentzer, an extremely localised species of the southern Balkans in Bulgaria, Greece and Turkey. It is almost identical in appearance to the non-European *D. (A.) mundata* (Stdgr.) which is found in Syria. Given the rarity of both species, dissection of the genitalia of *dervenaria* specimens might pay dividends (Bulgaria, near Ezerets, above Stara Kresna Station, limestone grassland and adjacent woodland, 21.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Gnopharmia stevenaria* (Boisd.), which has a decidedly southern distribution in Europe, being found in the Iberian, Italian and Balkan Peninsulas and in Turkey and the southern Russian states (Bulgaria, Kozhuh, near Petrich, 11.v.2010, leg. C. W. Plant & H. E. Beaumont, in coll. C. W. Plant); *Neognophina intermedia* (Wehrli), a mountain-dwelling species, though it can be found at relatively low altitudes. It is distributed in Europe throughout the Alps and the Carpathian mountain belts in Hungary, Transylvania, Bulgaria, Macedonia and Greece as well as further east. Reliable separation from *Rhopalognophos glaucinaria* (Hb.) may, as here, require examination of the genitalia (Romania – Transylvania, Rimetea, leg. C. W. Plant & H. E. Beaumont, in coll. C. W. Plant); Lemoniidae: *Lemonia balcanica* (H.-S.). The family Lemoniidae is not represented in Britain, though one species occurs along the bulk of the adjacent coastline of mainland Europe. *Lemonia balcanica*, however, is restricted to the extreme south-east of Europe, in the Balkans and Turkey (Bulgaria, Devil's Throat, Trigrad, 21.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); Arctiidae: *Cycnia (Diaphora) luctuosa* (Geyer), which is often on the wing in April, though it may persist into early July. It is found from Hungary eastwards and southwards in Europe (Romania – Transylvania, Rimetea, leg. C. W. Plant & H. E. Beaumont, in coll. C. W. Plant); *Phragmatobia luctifera* (D.&S.) = *caesarea* (Goeze) is a distinctive species found in much of Europe though absent from the western and northern zones (Bulgaria, Kresna Gorge, Struma River valley, 20.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Chelis maculosa* (Gerning), a very variable "tiger moth" affecting much of Europe, from Spain to Russia, though absent from the western and northern coastal zones. The exhibited example had a black bar in the central area of the hind wing – an unusual form (Bulgaria, Devil's Throat, Trigrad, 21.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); Noctuidae: *Acontia (Tarachidia) candefacta* (Hb.) (Plate 11, Fig. 7). This was introduced to Southern Russia from Canada to control *Ambrosia artemisiifolia* L. (Asteraceae), known as Common Ragweed in America, which is a very competitive invasive weed which can cause serious yield loss in crops. *Acontia candefacta* immediately became established and started to spread. It is now widespread across the Ukraine in Steppe habitat and in 2009 was recorded in Bulgaria (see Beshkov,

2010. *Entomologist's Record & Journal of Variation* **122**: 175–181). It can be expected to continue to spread westwards across Europe where, given its source country, climatic barriers are not expected to prevent it from eventually reaching Britain (Bulgaria, between Svet Nikola & Balgarevo, coastal cliff terrace grassland, 13.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Agrotis fatidica* (Hb.) is a high-altitude species that affects grassy alpine slopes and is distributed as physically separated populations in the Pyrenees, the Alps, the Apennine mountains and the Carpathian mountains above 1800 metres, with a population in Norway, where it occurs down to 750 metres (Bulgaria, Rila Mountains, 2200 metres, 19.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Discestra (Hadula) dianthi* Tauscher ssp. *hungarica* (Wagner). A very local species of the salt-steppes of the Carpathian Basin in Slovakia, Romania and Hungary, with the extreme east of Austria and an outlying population in Bulgaria (Hungary, Bugac sand dunes, 10.viii.2009, leg. C. W. Plant, in coll. C. W. Plant); *Discestra (Hadula) mendax* Stdgr. ssp. *occidentalis* Hacker is confined to the southern Balkans in Macedonia, Greece and Bulgaria. The nominotypical subspecies is found in Turkey (Anatolia) (Bulgaria, east of Malinova Burcina village, near Kalimantzi, 12.v.2010, leg. & in coll. C. W. Plant); *Lacanobia aliena* (Hübner) is a xerophilic and thermophilic moth, affecting warm, open, rocky steppe slopes across much of Europe (Slovakia, Rajecka Lesná, 27.v.2005, leg. C. W. Plant, D. Fraser & Rachel Terry, in coll. C. W. Plant); *Hadena filograna* (Esper) ssp. *filograna* Esper. The south-east European subspecies is reportedly lighter in colour than the nominotypical form and has been called ssp. *consparcata* (Freyer), though others, including the exhibitor, regard this as a mere form. The exhibited specimen, from Bulgaria, seemed to be referable to the darker ssp. *filograna* and thus supports that notion (Bulgaria, Aven village by Kamcija River (Black Sea area), 15.v.2010, leg. C. W. Plant & H. E. Beaumont, in coll. C. W. Plant); *Hadena irregularis* (Hufnagel) is widely presumed to be extinct in the British Isles. In parts of Europe, however, it remains fairly common and widespread in xerothermic habitats on sand or limestone (Hungary, Bugac sand dunes, 10.viii.2009, leg. C. W. Plant, in coll. C. W. Plant); *Enterpia (Hadena) laudeti* (Boisduval) is a distinct species (except in European Turkey, where it can be confused with *E. (H.) roseocandida* Hacker), occurring in three disjunct areas of Europe – in central Spain, the south-west Alps and the Balkans (including Asia Minor). Elsewhere there is a separate population in the Crimea before the main population centre affecting the area from Turkmenistan/Kazakhstan/Uzbekistan eastwards (Bulgaria, Kavarna, coastal cliffs, 15.viii.2009, leg. C. W. Plant, in coll. C. W. Plant); *Hadena silenes* (Hübner) is a species of hot, dry habitats in northern Spain, in the Mediterranean belt from France to Italy and as a disconnected population in the Balkans (Bulgaria, Matochina, 4.v.2009, leg. C. W. Plant & H. E. Beaumont, in coll. C. W. Plant); *Hecatera cappa* (Hübner) is a typical steppe species of lowland southern Europe, but it is also found in xerothermic mountain areas (Bulgaria, Kozhuh, Petrich, 26.v.2002, leg. C. W. Plant, D. Fraser & L. Gorman, in coll. C. W. Plant); *Mythimna congrua* (Hb.) is decidedly southern, affecting the Mediterranean belt from Spain to the Balkans, including all of Italy and extending from the southern Balkans around the north of the Black Sea to the Crimea (Bulgaria, Dolni Chiflik: coastal sand dunes, 16.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Xanthia sulphurago* (D.&S.) inhabits dry and warm deciduous forests in rocky habitats including karstic oak forests in southern Europe, though at the north of its range in middle Europe it affects deciduous woodland on sand (Bulgaria, German, near Sofia, 27.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Mycteroplus puniceago* (Boisd.), an

enigmatic species that appears to be extremely local in its distribution. Its ecology, including its larval food, is poorly known (Bulgaria, between Balchik & Topola, 15.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Staurophora celsia* (L.) is one of the most distinctive moths in Europe. It inhabits woodland in eastern and north-eastern Europe, as well as Fenno-Scandia, but is absent from the south, not extending further than southern Hungary, and from the west, not extending any further than Poland (Hungary, Bugac sand dunes, 23.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant); *Apamea (Abromias) syriaca* (Osthelder) is, at first glance, very similar to *A. (A.) monoglypha* (Hufn.) and it does indeed belong to that species group. It is a characteristic species of prairies, steppes and other arid biotopes (Bulgaria, Petrich, Kozhuh, 11.v.2010, leg. C. W. Plant & H. E. Beaumont, in coll. C. W. Plant); *Apamea (Abromias) zeta* (Tr.) There has been much nomenclatural confusion in the past, but DNA bar-coding has clarified the position. The British "Northern Arches" is *A. (A.) assimilis* ssp. *assimilis* (Doubleday) and is endemic to Britain. There is a second subspecies – ssp. *jenskeldi* Fibiger *et al.*, endemic to the Faeroe Islands. Our "Exile" is in fact *A. (A.) groenlandica* (Duponchel) which is confined to the Shetland Islands, Iceland and restricted parts of Norway. *A. (A.) exulis* (Lefeb.) is a Canadian species. *A. (A.) zeta* (Tr.) is a mountain species of southern Europe in the Pyrenees, Alps and the Carpathian Mountains. *A. (A.) maillardi* (Geyer) affects mountainous areas in southern Europe as ssp. *maillardi* and Fenno-Scandia as ssp. *schilderi* (Stdgr.) (Bulgaria, Rila Mountain, 2200 metres, 19.ix.2010, leg. C. W. Plant & A. J. Pickles, in coll. C. W. Plant).

TOWNSEND, M. C. – Lepidoptera from Tenerife 12–18th October 2009, mainly from a blended mv light in a hotel garden in Granadilla da Abona (south of the island, inland): *Pyrausta aegrotalis* (Zeller), one at light; *Hymenia recurvalis* (Fabr.), by day on waste ground in various places on the island; *Cryptoblabes gnidiella* (Millière), one at light (det. N. Hall); *Oxybia transversella* (Duponchel), at light (det. anonymous BENHS attendee); *Idaea guancharia* (Alphéraky), one at light and one at rest on a shop window in Granadilla; *Idaea abnorma* (Pinker), one at light; *Nebula ibericata* (Staudinger), one at light (det. anonymous BENHS attendee); *Eupithecia boryata* (Rebel), one at light; *Ascotis fortunata* (Blachier), at light; *Gnophos canariensis* (Rebel), one dead on road near Teno Alto in the west of the island; *Aspitates collinaria* (Holt-White), one at light; *Eilema albicosta* (Rogenhofer), numerous at light; *Rhyparia (= Canarctica) rufescens* (Brullé); *Agrotis trux* (Hübner), numerous at light; *Noctua noacki* (Boursin); *Spodoptera cilium* (Guenée), several at light; *Paradrina (= Caradrina) rebeli* (Staudinger) (subject to confirmation), several at light; *Cucullia calendulae* (Treitschke), one at rest on pavement in Granadilla da Abona; *Eublemma parva* (Hübner), one at light; *Hypena lividalis* (Hübner), numerous, flushed by day from low scrub on waste ground in various places on the island; *Abrostola canariensis* (Hampson), several at light; *Discestra trifolii* (Hufnagel) one at light. MCT was grateful to Norman Hall, an unknown attendee at the exhibition and Marcos Báez (Tenerife) for comments.

DIPTERA

DICKSON, R. J. – Various flies recorded in South Hampshire (VC 11) in 2010: *Ctenophora ornata* Meig. (Tipulidae), Roydon Wood NR (SU3000), New Forest, 26.vii, 3 males came to light at a BENHS field meeting; *Rhipidia maculata* Meig. (Limoniidae), Westbury Park (SU6523) near West Meon, 1.xi; *Dorycera graminum* (Fabr.) (Ulidiidae), Brownwich cliffs (SU5203), 7.vi, 17 individuals swept or

observed on stems in a small area of grassland on the cliff-top; *Hippobosca equina* (L.) (Hippoboscidae), Denny Wood (SU3306), New Forest, 17.v; *Nycteribia kolenatii* Theodor & Moscona (Nycteribiidae), female at Titchfield Haven NNR (SU5302), on a dead bat of genus *Myotis*, collected by Barry Duffin (warden) and Trevor Codlin (bat specialist); *Subclytia rotundiventris* (Fall.) (Tachinidae), Hen Wood near West Meon (SU6522), 3.ix. mv light and Funtley (SU565081), 10.ix, mv light (collected by M. Opie).

HALSTEAD, A. J. – Some uncommon or local Diptera taken in 2010. *Chrysopilus laetus* Zett. (Rhagionidae), male at mv light, 20.vii, RHS Garden (TQ062591), Wisley, Surrey; *Myolepta dubia* (Fabr.) (Syrphidae) female on hogweed *Heracleum sphondylium* flower, 1.viii, Chinthurst Hill car park, near Wonersh, Surrey (TQ014462); *Cheilosia caerulescens* (Meig.) (Syrphidae) female, 1.v, the exhibitor's garden in Knaphill, near Woking, Surrey (SU964587) – still present on *Sempervivum* plants after its first discovery in 2008; *Rhingia rostrata* (L.) (Syrphidae), swept, 18.iv, Hackhurst Down (TQ095488), near Gomshall, Surrey; *Acletoxenus formosus* (Loew) (Drosophilidae), reared from puparium on broccoli leaf infested with cabbage whitefly, emerged 12.ix, RHS Garden (TQ061583), Wisley, Surrey; *Psacadina zernyi* Mayer (Sciomyzidae), male and female swept 10.iv, Wokingpark Farm (TQ027571), Old Woking, Surrey; *Cordilura atrata* (Zett.) (Scathophagidae), male swept 5.vi at 1800ft, Ben Lawers crags (NN602390), Mid Perthshire; *Norellisoma opacum* (Loew) (Scathophagidae), male swept 8.vi, Kindrogan Field Centre (NO062625), Enochdu, E. Perthshire; *Hemyda vittata* (Meig.) (Tachinidae) female on wild parsnip *Pastinaca sativa* flower, 15.viii, Hackhurst Down (TQ095488), near Gomshall, Surrey; *Gonia divisa* Meig. (Tachinidae), male on sallow catkin, 10.iv, Wokingpark Farm (TQ062591), Old Woking, Surrey.

HAWKINS, R. D. – *Trichopoda pennipes* (Fabr.) (Tachinidae), reared (emerged 9.vi.2010) from a French specimen of the southern green shieldbug *Nezara viridula* (L.) (Hemiptera: Pentatomidae), collected on 28.ix.2009 on a visit to the wine-making chateau of Monbazillac, near Bergerac, Dordogne, France. The bug was found bearing a tachinid egg on the front corner of its pronotum and was kept alive throughout the following winter, during which its colour became a dark olive-green. In spring it once again became bright green and began to feed again, surviving until May when the tachinid larva emerged and pupated. This species has black-banded wings, stripes of golden hair on a black thorax, a shiny black abdomen and a row of flattened bristles on each hind tibia. It is a native of North America, which was introduced to Europe in the early 1980s for the purpose of biological control, and is a known parasitoid of *N. viridula*.

NAU, B. – Photographs of larvae of a *Volucella* species (Syrphidae) found in numbers in a house having evidently entered an upstairs bathroom lampshade from the loft above where they had presumably inhabited a wasp nest, in which they are scavengers or predators of wasp larvae. The exhibit was augmented by photographs of the adults of *Volucella*, taken by Judy Webb.

PARKER, M. J. – Some notable species of Diptera encountered during 2010 from Dorset (VC 9), Berkshire (VC 22) and South Aberdeenshire (VC 92): *Ctenophora flaveolata* (Fabr.) (Tipulidae), female flying across a woodland track at Highstanding Hill (SU9373), Windsor Forest, Berks, 23.v; *Hybomitra lurida* (Fall.) (Tabanidae), male in Inverey area (NO085883), near Braemar, South Aberdeenshire, 7.vii; *Brachyopa bicolor* (Fall.) (Syrphidae), female on *Acer pseudoplatanus* trunk, Melbury Park area (ST5705), Dorset, 5.vi; *Psilota anthracina* (Mg.) (Syrphidae), male at *Malus* species flowers in Melbury Osmond area (ST5707), Dorset, 9.vi; *Syrphus nitidifrons* Becker (Syrphidae), female hovering in woodland clearing within

Delcombe Wood (ST7805), Dorset, 10.v, new to Britain (see *Dipterists Digest* (*Second Series*) 2010. **17:** 145–146); *Bithia demotica* (Egger) (Tachinidae), female swept from coastal grassland, Osmington Mills (SY714819), 16.vi, a name new to the British list but it has recently been established that British material identified as *B. modesta* (Meig.) belongs to this species; *Carcelia bombylans* Rob.-Des. (Tachinidae), male at *Euphorbia amygdaloides* flowers, Delcombe Wood (ST7805), 10.v; *Hemyda vittata* (Meig.) (Tachinidae), male and female alighting on a sandy patch in woodland clearing, Chetterwood (ST9608), Dorset, 2.viii; *Tachina lurida* (Fabr.) (Tachinidae), female on *Crataegus monogyna* blossom at Cranbourne Chase, Windsor Forest (SU9472), Berks

PERRY, I. – A selection of uncommon Diptera found during 2010: *Ferneiella brevifurca* (Enderlein) (Scatopsidae), Thompson Common, Norfolk (TL9396), 3.vi, apparently the first British record since its discovery at Horning Ferry in the Norfolk Broads by J. E. Collin in 1953; *Chrysopilus laetus* Zett. (Rhagionidae), Lode, Cambs (TL531626), 14.vii, a male feeding at honeydew on plum *Prunus domestica* in the exhibitor's garden; *Heringia senilis* Sack (Syrphidae), Lode, Cambs (TL531626), 27.vii, two males on flowers of fennel *Foeniculum vulgare* – from a small series of males found in the exhibitor's garden during 2010, it was realised that most of the characters used to distinguish this species from *H. heringi* (Zett.) were very variable, the only consistent feature found was the longer third antennal segment of *H. senilis* as illustrated by R. A. Jones (2001. *British Journal of Entomology and Natural History* **14:** 185–194); *Myopa fasciata* Meig. (Conopidae), Tunstall Forest (TM3853), Suffolk, 5.viii, a male on flowers of ragwort *Senecio jacobaea* – it may prove to be quite widespread in the Suffolk Sandlings, although it seems to have disappeared from most if not all of its former haunts in East Anglia; *Earomyia schistopyga* Collin (Lonchaeidae), Denny Lodge Inclosure (SU3404), New Forest, Hants, 30.iv, two males swept from larch *Larix decidua*; *Dorycera graminum* (Fabr.) (Ulidiidae), The Naze (TM2624), Essex, 10.vii, two females swept from white poplar *Populus alba* and Magog Down (TL4853), Cambs, 6.vii, female at honeydew on sycamore *Acer pseudoplatanus* at edge of downland; *Parochthiphila spectabilis* (Loew) (Chamaemyiidae), Roydon Common, Norfolk (TF6822), 26.vii, swept from sparse *Phragmites australis* at the edge of the bog; *Aphaniosoma socium* Collin (Chyromyidae), The Naze (TM267238), Essex, 10.vii, swept from soft cliff seepage, first discovered in the area in 1912 by J. E. Collin; *Fannia vesparia* (Meade) (Fanniidae), Denbies (TQ147502), Surrey, 15.viii, male on flowers of parsnip *Pastinaca sativa*; *Helina tetrastigma* (Meig.) (Muscidae), Sheepleas (TQ0851), Surrey, 8.viii, male on flowers of parsnip and Box Hill (TQ1852), Surrey, 21.viii, male on birch trunk *Betula pendula*; *Hebia flavipes* Rob.-Des. (Tachinidae), Pondhead Inclosure (SU311071), New Forest, Hants, 30.iv and White Downs (TQ1149), Surrey, 15.v; *Ernestia puparum* (Fabr.) (Tachinidae), Finchampstead Ridges (SU808633), Berks, 10.iv, a small group of males were found in an area of grassy heath at edge of mainly birch woodland.

TELFER, M. G. & HARVEY, M. C. – *Pandivirilia melaleuca* (Loew) (Therevidae) from Bucks (VC 24): two individuals were found at the edge of Hollybush Wood (TQ001828), within the Rowley Woods complex, 5.viii.2010, during survey work carried out for Buckinghamshire County Council. They were found in a barrel trap – a large plastic barrel (photograph also exhibited), at the edge of the wood, had filled up with water on which insects were floating in varying stages of decay. Although originally recorded only from the Windsor and Ascot areas, this saproxylic species has recently been found in other areas including sites in Gloucs and Worcs. The Rowley Woods complex includes woodland and farmland with mature and over-

mature trees along field boundaries and at wood edges, which have been shown to support an exceptional range of saproxylic species of insects, as have the adjacent sites of Black Park Country Park and Langley Park.

Coleoptera

Alexander, K. N. A. – A selection of rare beetles from Grimsthorpe Park, Lincolnshire, TF0319: *Procraerus tibialis* (Boisduval & Lacordaire) (Elateridae), one in spider web on standing dead parkland oak, 27.v.2010; *Rhagonycha lutea* (Müller) (Cantharidae), singletons from foliage of parkland oaks, 7.vii.2010; *Malthinus frontalis* (Marsham) (Cantharidae), one swept beneath ancient parkland oak, 7.vii.2010; *Malthodes crassicornis* (Mäklin) (Cantharidae), one swept beneath ancient parkland oak, 27.v.2010; *Hedobia imperialis* (L.) (Anobiidae), one knocked from oak branches, 7.vii.2010; *Xyletinus longitarsis* Jansson (Anobiidae), one swept by a lying dead oak hulk in open parkland, 27.v.2010; *Tillus elongatus* (L.) (Cleridae), one ovipositing into exposed wood on shady side of dead lying oak, 27.v.2010; *Abdera biflexuosa* (Curtis) (Melandryidae), knocked from aerial dead branches on old parkland oaks, 7.vii.2010; *Poecilium alni* (L.) (Cerambycidae), one knocked from dead twigs on fallen oak branch, 27.v.2010.

Booth, R. G. – *Dyschirius impunctipennis* Dawson (Carabidae), Beadnell Bay, N. Northumberland, NU229275, on surface of sand near high tide level among *Bledius subniger* colony, 27.vii.2009. *Anotylus insecatus* (Gravenhorst) (Staphylinidae), Beddington Sewage Farm, Surrey, TQ2866, crawling over stone on gravelly/sandy track during a hot afternoon, 24.v.2009. *Microrhagus pygmaeus* (Fabr.) (Eucnemidae), Laleham, Middlesex, TQ0669, one male from beating ash tree, 19.vi.2010, apparently a new record for Middlesex. *Atomaria turgida* Erichson (Cryptophagidae), Loch an Eilein, E. Inverness, NH896078, one female by beating fallen pine branch in woodland, 19.vii.2009, another record for this fairly recent addition to the UK list. *Tetrops starkii* Chevrolat (Cerambycidae), Laleham, Middlesex, TQ0669, one male by sweeping under ash trees late afternoon, 17.vii.2010, possibly the fifth British record and the first from Middlesex. *Longitarsus aeruginosus* (Foudras) (Chrysomelidae), Folkestone Warren, E. Kent, TR2436, numerous rather teneral examples feeding on leaves of *Eupatorium cannabinum* just above cliff base, 30.viii.2009, found during the BENHS field meeting to the area, apparently the first British record for almost 85 years and a new record for Kent. *Miarus campanulae* (L.) (Curculionidae), Balnacruie (v.c. 95 Elgin), NH971227, in flowers of *Campanula rotundifolia* by side of track, 19.vii.2009, a northern extension to its previously known range in Scotland.

Coker, K. – *Melanotus castanipes* (Paykull) (Elateridae), Chancellor's Copse, S. Hampshire, SU5910, under bark of dead Scots Pine, 4.vii.2010, an aberrantly coloured example with the antennae, head, pronotum, and legs dark red making its identification using standard texts problematic.

Dickson, R. J. – *Carabus arvensis* Herbst (Carabidae), Denny Wood, New Forest, S. Hampshire, SU3306, collected on a trunk at night, to drips from a 'wine rope' by K. J. Wheeler, 13.viii.2010. *Harpalus anxius* (Duftschmid) (Carabidae), Sinah Common, Hayling, S. Hampshire, SZ6999, three males together under a stone on sand-dunes with emergent vegetation, 14.vi.2010. *Quedius truncicola* Fairmaire & Laboulbène (Staphylinidae), Denny Wood, New Forest, S. Hampshire, SU3306, running in fissure of an oak containing Goat Moth, 30.viii.2010. *Brachygluta helferi* (Schmidt-Göbel) (Staphylinidae), Brownwich cliffs, S. Hampshire, SU5302, by grubbing at the base of the cliff/ top of the beach, 7.x.2010. *Gonodera luperus* (Herbst) (Tenebrionidae), Whitelands Wood near Petersfield, S. Hampshire,

SU7220, taken at mv light by K. J. Wheeler, 11.vi.2010. *Cryptocephalus parvulus* (O. F. Müller) (Chrysomelidae), Botley Wood, S. Hampshire, SU5410, by sweeping, 19.vii.2010. *Longitarsus brunneus* (Duftschmid) (Chrysomelidae), Westbury Park near West Meon, S. Hampshire, SU6523, male at mv light, 23.vii.2010.

HALSTEAD, A. J. – *Demetrias imperialis* (Germar) (Carabidae), Wokingpark Farm, Old Woking, Surrey, TQ027571, sweeping, 10.iv.2010. *Dendroxena quadrimaculata* (Scopoli) (Silphidae), High Standing Hill, Windsor Forest, Berkshire, SU9374, female swept, 23.v.2010. *Hylecoetus dermestoides* (L.) (Lymexylidae), Hackhurst Down, Surrey, TQ095488, female swept from oak, 18.iv.2010. *Lymexylon navale* (L.) (Lymexylidae), Esher Common, Surrey, TQ128624, female on felled tree trunk near Black Pond, 17.vii.2010. *Stictoleptura rubra* (L.) (Cerambycidae), Brookwood, Surrey, SU953572, on parsnip flower at Sheets Heath allotments, 17.vii.2010. *Judolia sexmaculata* (L.) (Cerambycidae), near Bridge of Garry, Mid Perthshire, NN911610, collected by Guy Knight from a wood, 6.vi.2010. *Agelastica alni* (L.) (Chrysomelidae), Woodsmoor near Stockport, Cheshire, SJ904874, on alder, 6.ix.2010.

HENDERSON, M. – *Cetonia aurata* (L.) (Scarabaeidae), London Borough of Merton, Surrey, one found dead on path leading to Merton Abbey Mills, 24.v.2010. *Phyllopertha horticola* (L.) (Scarabaeidae), between Shawford and Eastleigh, Hampshire, on umbellifer on bank of River Itchen, 24.v.2008. *Hoplia philanthus* (Fuessly) (Scarabaeidae), Cranbury Park, Chandler's Ford, Hampshire, male on dock, 19.vi.2010, and Merton Abbey, Surrey, female flying in sunshine in garden, 21.vi.2010.

LEVEY, B. – (1) Some rare and notable beetle species captured in recent years. *Amara fulva* (Müller) (Carabidae), Feshiebridge, Easterness, NH852026, on riverine shingle/sand, 28.vi.2008, and Nethy Bridge, Elgin, NH993223, riverine shingle/sand, 4.vii.2008. *Amara quenseli* (Schönherr) (Carabidae), Dorback Burn, Elgin, NJ0716, under stones on periglacial sand dunes, 1.vii.2008. *Miscodera arctica* (Paykull) (Carabidae), Feshiebridge, Easterness, NH852026, riverine shingle/ sand, 28.vi.2008, and Dorback Burn, Elgin, NJ0716, riverine sand/ shingle, 1.vii.2008. *Hydrochus brevis* (Herbst) (Hydrochidae), Loch Vaa, Aviemore, Elgin, NH912173, edge of loch with much waterweed, 4.vii.2008. *Aegialia* (*Psammoporus*) *insularis* Pittino (Scarabaeidae), Dorback Burn, Elgin, NJ0716, under stones on periglacial sand dunes, 1.vii.2008. *Cis jacquemartii* Mellié (Ciidae), Inshriach House, Easterness, NH8707, ex. *Fomes* sp. on birch, collected vi.2008, emerged xii.2008. *Ropalodontus perforatus* (Gyllenhal) (Ciidae), Inshriach House, Easterness, NH8707, ex. *Fomes* sp. on birch, collected vi.2008, emerged 2009. *Anastrangalia sanguinolenta* (L.) (Cerambycidae), Glenmore Forest Park, Easterness, NH987094, 4.vii.2008. *Judolia sexmaculata* (L.) (Cerambycidae), Glenmore Forest Park, Easterness, NH979091, 27.vi.2008. *Podagrica fuscipes* (Fabr.) (Chrysomelidae), Stretham, Cambridgeshire, TL5173, swept from *Malva* sp., 20.vi.1999. *Cassida nebulosa* L. (Chrysomelidae), Yew Hill Nature Reserve, Winchester, S. Hampshire, SU455265, sweeping chalk grassland, 30.vii.2008. *Magdalis phlegmatica* (Herbst) (Curculionidae), Coylumbridge, Easterness, NH921107, 3.vii.2008. (2) A selection of species of Oedemeridae from Europe. This family has many more species in mainland Europe than in the British Isles, including a number of endemic species with very limited distributions. Adults often frequent flowers. The larvae either feed in dead wood (*Angocodes*, *Chrysanthia, Xanthochroina* and some *Oedemera*) or in herbaceous plant stems or roots (some *Oedemera*, *Stenostoma*). *Anogcodes fulvicollis* (Scopoli), species from central and southern Europe, France, B. Pyrenees, Bedous, Osse, Pic d'Aspe, 22.viii.1926; *Anogcodes rufiventris* (Scopoli), widespread European species, Slovenia, Nova vas, Volčje, Blośko jezero, 3.vi.2003; *Anogcodes seladonius* ssp. *alpinus* (Schmidt), subspecies from Central Europe, Slovenia, Dragonja, Križišče, Stena pri

Dragonji, 8.vi.2003; *Anogcodes ustulatus* (Scopoli), widespread European species, Slovenia, Boršt, Škrline, nr. river Dragonja, 8.vi.2003; *Chrysanthia cyprica* Pic, endemic species from Cyprus, Cyprus, Lefkosia Dist., Leivadi, near Cedar Valley, 17.vi.2009, on pink flowered *Cistus* sp.; *Chrysanthia reitteri* Seidlitz, species from Iberia, Portugal, Algarve, 10 km N. Sao Bras de Alportel, 5.v.1998; *Chrysanthia superba* Reitter, species from Iberia and North Africa, Portugal, Algarve, 7 km E. of Monchique, 8.v.1998; *Chrysanthia viridissima* (L.), a widespread European species, France, Gironde, Arcachon, 12.vii.1913; *Oedemera* (*s.str.*) *barbara* (Fabr.), widespread Mediterranean species, Portugal, Algarve, Cape St. Vincent, 5 km W. of Sagres, 6.v.1998; *Oedemera* (*s.str.*) *basipes* Abeille de Perrin, endemic species from Cyprus, Cyprus, Lefkosia Dist., 3km south of Pachyammos, 14.vi.2009, on pink flowered *Cistus* sp.; *Oedemera* (*s.str.*) *femorata* (Scopoli), widespread European species, Slovenia, Razdrto, Hudicevec, 2.vi.2003; *Oedemera* (*s.str.*) *inapicalis* Pic, endemic species from Cyprus, Pafos Dist., 2 km from Pegeia, 16.vi.2009; *Oedemera* (*s.str.*) *podagrariae* ssp. *podagrariae* (L.), widespread European subspecies, Pliskovica, Ledina, 7.vi.2003; *Oedemera* (*s.str.*) *pthysica* (Scopoli), widespread European species, Slovenia, Razdrto, Hudicevec, 2.vi.2003; *Oedemera* (*s.str.*) *simplex* (L.), species from the Western Mediterranean, Spain, Mallorca, Parc natural de s'Albufera, 17.v.2008; *Oedemera* (*s.str.*) *unicolor* Schmidt, species from Iberia and Morocco, Portugal, Algarve, 10 km N. Sao Bras de Alportel, 5.v.1998; *Oedemera* (*Oncomera*) *flavicans* Fairmaire, species from the Eastern Mediterranean, Lefkosia Dist., 2 km from Pachyammos, 20vi.2009; *Oedemera* (*Stenaxis*) *annulata* Germar, species from South East Europe, Slovenia, Razdrto, Hudicevec, 6.vi.2003; *Opsimea ventralis* Miller, sparsely distributed Eastern Mediterranean species, Greece, Thassos Island, Makriamos, 25.v.1999; *Stenostoma rostratum* ssp. *septentrionale* Svihla, a species confined to dune systems of the Atlantic and Mediterranean coasts of Europe, France, Gironde, Arcachon, 3.vi.1913; *Xanthochroina auberti* Abeille de Perrin, rare sparsely distributed Mediterranean species, Spain, Mallorca, Sa Dragonera, Andratx, at light, 12.vii.2005.

MANN, D. – An exhibit showing the British species of Meloidae, including *Meloe brevicollis* Panzer (Plate 12, Fig. 9), collected Baigh nan Trailleich, Coll, Scotland, 25.v.2010.

MORRIS, M. G. – A small selection of Cleonine weevils (Coleoptera, Curculionidae: Lixinae-Cleonini), a subfamily very poorly represented in the British Isles, but with large and attractive representatives elsewhere in the Western Palaearctic, taken by the exhibitor, except where stated. *Bothynoderus affinis* (Schrank), Bulgaria, nr. Vranina, 18.vi.2008, a rare British species, probably an immigrant, last recorded from the outskirts of the New Forest in 1936. *Bothynoderus andreae* Colonnelli, Italy, Lucania, 24.iv.1989, leg. E. Colonnelli, a paratype of this recently-described species. *Cleonis pigra* (Scopoli), England, Devon, Braunton Burrows, 17.v.1990, the only fairly common British cleonine, associated with thistles on sandy substrates, especially *Cirsium arvense*. *Coniocleonus excoriatus* (Gyllenhal), Canary Is., Fuerteventura, 28.xi.2006, this is one of the less rare of seven species of Cleonini known from the Canaries. *Coniocleonus hollbergi* (Fåhraeus), Slovakia, Malacky, undated, leg. V. Vyhnálek, an extinct British species, formerly taken in Surrey in the early nineteenth century. *Coniocleonus nebulosus* (L.), England, Dorset, Studland, on bare sand, 26.v.1992, the rarer of our two extant cleonine species, it is associated with heathland, but its biology is not known with certainty. *Conorhynchus brevirostris* (Gyllenhal), Canary Is., Gran Canaria, Ariñaga, 19.xi.1999, a scarce species, though not confined to the Canaries. *Conorhynchus conicirostris* (Olivier), Canary Is., Fuerteventura, nr. Antigua, 23.xi.2006, in contrast to its congener this is

a very common species, recorded from every island except La Gomera. *Conorhynchus nigrivittis* (Pallas), Armenia, nr. Gami, 12.vii.2003, leg. V. Zieris, Eastern Europe is home to a rich and varied cleonine fauna, of which this species is an example. *Cyphocleonus armitagei* (Wollaston), Canary Is., Tenerife, Monte de los Silos, undated, leg. J. de Ferrer, one of the species named by the pioneer of Canarian Coleoptera, T. Vernon Wollaston. *Cyphocleonus morbilosus* (Fabr.), Spain, Monte el Boalar, Pyrenees nr. Jaca, 16.ix.1974, several British coleopterists who collect in Europe have found Cleonini to be scarce, this is the only example of the species that I have found in c. 40 years' collecting abroad. *Cyphocleonus tigrinus* (Panzer), France, Hautes-Alpes, nr. Crots, beaten from *A. vulgaris*, 30.v.2005, a weevil that is associated with species of *Artemisia*. *Leucochromus imperialis* (Zoubkof), a large and impressive cleonine, as its species-group name implies, however the data attached to the specimen are difficult to read, the specimen possibly comes from Turkestan. *Leucomigus candidatus* (Pallas), S. Russia, Rostov region, 11.ix.2003, leg. Melnikov, an attractive, east European species. *Leucophyes occidentalis* Dieckmann, Spain, Oisa, Pyrenees nr. Jaca, 19.v.1977, the distinguished author of this species showed in 1982 that it was distinct from *L.*(as *Leucosomus*) *pedestris* (Poda) and that it has a western distribution in Europe. *Liocleonus clathratus* (Olivier), Turkey, Gozsgace, 3.vii.1992, collector not recorded, another very attractive eastern European (?) species. *Lixomorphus algirus* (L.), Corsica, Porto Pollo, 10.iv.1988, again, the only example of the species that has come the exhibitor's way, and an indifferent specimen at that. *Mecaspis alternans* (Herbst), France, Var, nr. Ponteves, 20.iv.2006, a species that is associated with *Daucus carota*, several other cleonines occurred in the locality where the specimen was taken, but they were all taken by other coleopterists! *Pseudocleonus cinereus* (Schrank), France, Lozère, Causse Mejean, running on bare ground, 22.iv.2006, not a very uncommon species. *Rhabdorrhynchus anchusae* (Chevrolat), Turkey, Birecik, 30.v.1998, leg. M. Snizek, another very attractive species of eastern Europe.

ORAM, D. – Beetles from two areas of Southern France during 2010. (1) Saint-Paul-Lizonne, about 40 miles north of Bergerac in the Dordogne, 26.v.–5.vi.2010. *Cetonia aurata* (L.) (Scarabaeidae), *Tropinota hirta* (Poda) (Scarabaeidae), *Trichodes alvearius* (Fabr.) (Cleridae), *Omophlus lepturoides* (Fabr.) (Tenebrionidae, Alleculinae), *Stenocorus meridianus* (L.) (Cerambycidae), *Clytra quadripunctata* (L.) (Chrysomelidae), *Cryptocephalus flavipes* Fabr. (Chrysomelidae), *Cryptocephalus sericeus* (L.) (Chrysomelidae), *Cryptocephalus vittatus* Fabr.(Chrysomelidae), and *Apion longirostre* (Olivier) (Apionidae), on hollyhock, *Althaea rosa*, this weevil species has spread from the Middle East westwards through Europe in recent decades and been found recently in Britain. (2) Aspiran, about 30 miles north of Montpellier Herault, 29.vii.–5.viii.2010. *Potosia* (*Cetonia*) *aeruginosa* (Drury) (Scarabaeidae), *Mylabris duodecimpunctata* Tauscher (Meloidae), and *Coptocephala unifasciata* (Scopoli) (Chrysomelidae).

TELFER, M. G. – *Blemus discus* (Fabr.) (Carabidae), Ham Wall RSPB Reserve, North Somerset, c.ST4640, by pitfall and pan trapping from reedbeds by Donna Harris and Anna Doeser (RSPB), 9.vi.–30.viii.2009, new to Somerset. *Ophonus rupicola* (Sturm) (Carabidae), Middle Shelspit Farm, Thornborough, Buckinghamshire, SP7533, in a tin set into a lawn as part of a mini-golf course (!), 6.ix.2009. *Lebia cruxminor* (L.) (Carabidae), near Dolgellau, Merionethshire, SH71, 1.v.2009, one of three seen. *Saprinus planiusculus* Motschulsky (Histeridae), Blakeney Point, West Norfolk, TF998459, 12.ix.2009. *Carpelimus lindrothi* Palm (Staphylinidae), Ham Wall RSPB Reserve, North Somerset, c.ST4640, by pitfall and pan trapping from reedbeds by Donna Harris and Anna Doeser (RSPB), 9.vi.–30.viii.2009, new to Somerset. *Teropalpus unicolor* (Sharp) (Staphylinidae), Dawlish Warren, South

Devon, SX9979, seaward side beach, 19.iv.2009. *Anotylus insecatus* (Gravenhorst) (Staphylinidae), Eaton Bray, Bedfordshire, SP968208, in old seed potatoes, 20.ix.2009. *Rugilus similis* (Erichson) (Staphylinidae), Langley Park, Buckinghamshire, TQ010819, 15.ii.2009. *Xantholinus laevigatus* Jacobsen (Staphylinidae), Croxton Hall Farm, Thetford, West Norfolk, TL8685, 5.vii.2009, only the second Norfolk record. *Oligota apicata* (Erichson) (Staphylinidae), Hog and Hollowhill Woods, Buckinghamshire, SU8285, 2.vi.2009. *Phytosus nigriventris* (Chevrolat) (Staphylinidae), Dawlish Warren, South Devon, SX9979, 19.iv.2009, and Blakeney Point, West Norfolk, TF989460, 12.ix.2009, first for Norfolk. *Myrmecopora brevipes* Butler (Staphylinidae), Dawlish Warren, South Devon, SX989794, seaward side beach, 19.iv.2009. *Myrmecocephalus concinnus* (Erichson) (Staphylinidae), Dinton Pastures Country Park, Hurst, Berkshire, SU779718, in woodchip pile in overflow car park, 22.ii.2009, discovered here by Peter Hammond. *Boreophilia eremita* (Rye) (Staphylinidae), Hickling Broad, Norfolk, TG42, by pitfall and pan trapping from reedbeds by Donna Harris and Anna Doeser (RSPB), 9.vi.–30.viii.2009, new record for Norfolk. *Alaobia scapularis* (C. R. Sahlberg) (Staphylinidae), Roade Quarry, Northamptonshire, SP7551, scavenging on the gooey innards of a freshly dead but disintegrating *Pterostichus madidus* (Fabr.) (Carabidae), 10.viii.2009. *Philhygra terminalis* (Gravenhorst) (Staphylinidae), Stodmarsh, East Kent, TR26, by pitfall and pan trapping from reedbeds by Donna Harris and Anna Doeser (RSPB), 9.vi.–30.viii.2009, new to Kent. *Microdota liliputana* (Brisout) (Staphylinidae), Ham Wall RSPB Reserve, North Somerset, c.ST4640, by pitfall and pan trapping from reedbeds by Donna Harris and Anna Doeser (RSPB), 9.vi.–30.viii.2009, new to Somerset. *Alevonota gracilenta* (Erichson) (Staphylinidae), Gallows Hill, near Thetford, West Norfolk, TL8684, 6.v.2008, 2nd Norfolk record. *Ilyobates nigricollis* (Paykull) (Staphylinidae), Hog and Hollowhill Woods, Buckinghamshire, SU8286, 2.vi.2009, probably the first for Bucks. *Euplectus tholini* Guillebeau (Staphylinidae), Windsor, Berkshire, SU97, found on oak, 24.vi.2009. *Hydrocyphon deflexicollis* (P. W. J. Müller) (Scirtidae), Lyranes Lower, South Kerry, V7186, beating riverside foliage, 26.vii.2009. *Ampedus pomonae* (Stephens) (Elateridae), Blackstones Bridge, N. of and E. of Caragh River, South Kerry, V707872, dead adult in pupal chamber with exuviae, in birch log of 2.5 inch diameter, c. 1 foot long, 25.vii.2009, two *Ampedus* larvae also found. *Procraerus tibialis* (Boisduval & Lacordaire) (Elateridae), Rowley Woods complex, Buckinghamshire, SU9982, in oak red-rot, 11.ix.2009. *Oedostethus quadripustulatus* (Fabr.) (Elateridae), Rowley Woods complex, Buckinghamshire, TQ0082, 1.vii.2009, first for Bucks since before 1950. *Aulonothroscus brevicollis* (de Bonvouloir) (Throscidae), Little Rowley Wood, Buckinghamshire, TQ004826, from hollow Hornbeam, 14.vii.2009. *Malthodes* sp. (Cantharidae), Stodmarsh, East Kent, TR26, by pitfall and pan trapping from reedbeds by Donna Harris and Anna Doeser (RSPB), 9.vi.–30.viii.2009, an as yet un-named species new to Britain. *Laricobius erichsonii* Rosenhauer (Derodontidae), Rowley Woods complex, Buckinghamshire, TQ0082, beaten from oak, 14.vii.2009, possibly the first for Bucks. *Trinodes hirtus* (Fabr.) (Dermestidae), Langley Park, Buckinghamshire, TQ0082, 1.vii.2009. *Anobium nitidum* Fabr. (Anobiidae), Rowley Woods complex, Buckinghamshire, TQ0082, 1.vii.2009, possibly the first for Bucks. *Ptinus dubius* Sturm (Anobiidae), Brooklands Heights Business Park, Surrey, TQ070624, beating *Pinus nigra*, 22.v.2009, a second record for Surrey, Roger Booth found one here on 11.xi.2007. *Korynetes caeruleus* (De Geer) (Cleridae), Windsor, Berkshire, SU97, swept beneath an oak, 24.vi.2009. *Cerapheles terminatus* (Ménétriés) (Malachiidae), Stodmarsh, East Kent, TR26, by pitfall and pan trapping from reedbeds by Donna Harris and Anna Doeser (RSPB), 9.vi.–30.viii.2009, new to Kent. *Phloiophilus edwardsii* Stephens (Phloiophilidae),

Langley Park, Buckinghamshire, TQ010818, 17.x.2009. *Hylecoetus dermestoides* (L.) (Lymexylidae), Northmoor Hill Wood, Buckinghamshire, TQ0389, 5.v.2009. *Lymexylon navale* (L.) (Lymexylidae), Rowley Woods complex, Buckinghamshire, TQ0082, 14.vii.2009. *Meligethes atramentarius* Förster (Nitidulidae), Northmoor Hill Wood, Buckinghamshire, TQ0389, 5.v.2009. *Cryptarcha undata* (Olivier) (Nitidulidae), Little Rowley Wood, Buckinghamshire, TQ004826, 14.vii.2009. *Rhizophagus oblongicollis* Blatch & Horner (Monotomidae), Ebernoe Common, West Sussex, SU9726, flight interception trap, beech, 4–18.vi.2009, apparently the first for Sussex. *Cryptamorpha desjardinsii* (Guérin-Méneville) (Silvanidae), Eden Project Humid Tropics Biome, Bodelva, East Cornwall, SX0454 and SX0455, 17.iv.2009. *Leptophloeus clematidis* (Erichson) (Laemophloeidae), Cliveden NT, Buckinghamshire, SU909843, 7.ii.2009. *Atomaria umbrina* (Gyllenhal) (Cryptophagidae), Blakeney Point, West Norfolk, TG001457, near landing area, 12.ix.2009, first for Norfolk. *Cryptophilus integer* (Heer) (Languriidae), Dinton Pastures Country Park, Hurst, Berkshire, SU779718, in woodchips in overflow car park, 22.ii.2009, discovered here by Peter Hammond. *Oxylaemus cylindricus* (Creutzer in Panzer) (Bothrideridae), Ebernoe Common, West Sussex, SU976270, glades subterranean trap, 7.vii.–27.viii.2009, one of 21 individuals trapped from two oak trees, the first British records since Sherwood Forest (c.1899–1902) before which it had been recorded from the New Forest on a few occasions. *Oxylaemus variolosus* (Dufour) (Bothrideridae), Ebernoe Common, West Sussex, SU976270, glades subterranean trap, 7.vii.–27.viii.2009, occurred with *O. cylindricus* but only 11 individuals in total. *Stephostethus alternans* (Mannerheim) (Latridiidae), Ebernoe Common, West Sussex, SU979274, flight interception trap E, oak, 16–30.vii.2009, I am not aware of any other Sussex records. *Corticarina truncatella* (Mannerheim) (Latridiidae), Blakeney Point, West Norfolk, TF997459, 13.ix.2009. *Melanophthalma transversalis* (Gyllenhal) (Latridiidae), Blakeney Point, West Norfolk, TF988457, at Far Point, 12.ix.2009. *Berginus tamarisci* Wollaston (Mycetophagidae), Brooklands Heights Business Park, Surrey, TQ070624, off *Pinus nigra*, 22.v.2009, discovered here new to Britain by Tony Allen and Roger Booth on 11.xi.2007. *Rabocerus foveolatus* (Ljungh) (Salpingidae), Ebernoe Common, West Sussex, SU9726, flight interception trap, beech, 14–27.viii.2009, apparently the first for Sussex. *Orchesia minor* Walker (Melandryidae), Ebernoe Common, West Sussex, SU9727, old growth, off fallen beech, branches still with attached dead leaves, 22.v.2009. *Abdera biflexuosa* (Curtis) (Melandryidae), Rowley Woods complex, Buckinghamshire, TQ0082, 1.vii.2009. *Scraptia fuscula* P. W. J. Müller, (Scraptiidae), Rowley Woods complex, Buckinghamshire, TQ0082, 1.vii.2009, first for Bucks. *Scraptia testacea* Allen (Scraptiidae), Rowley Woods complex, Buckinghamshire, TQ0082, 1.vii.2009. *Vanonus brevicornis* (Perris) (Aderidae), Windsor, Berkshire, SU97, one of two beaten from foliage adjacent to the trunk of an oak, 21.vii.2009. *Pogonocherus hispidulus* (Piller & Mitterpacher) (Cerambycidae), Hog & Hollowhill Woods, Buckinghamshire, SU8285, beating oak, 2.vi.2009. *Calomicrus circumfusus* (Marsham) (Chrysomelidae), East Cornwall, common on gorse, 11.vi.2009. *Ochrosis ventralis* (Illiger) (Chrysomelidae), East Cornwall, by suction sampling, 9.vii.2009. *Apteropeda globosa* (Illiger) (Chrysomelidae), Northmoor Hill Wood, Buckinghamshire, TQ0389, 5.v.2009. *Neocoenorrhinus interpunctatus* (Stephens) (Rhynchitidae), Ebernoe Common, West Sussex, SU9727, glades, 22.v.2009. *Temnocerus tomentosus* (Gyllenhal) (Rhynchitidae), East Cornwall, beating *Salix*, 11.vi.2009, apparently the first for Cornwall. *Otiorhynchus crataegi* Germar (Curculionidae), Tesco store, Leighton Buzzard, Bedfordshire, SP916252, 28.ix.2008, possible first for Bedfordshire, and 30.ix.2009. *Brachyderes incanus* (L.) (Curculionidae), Brooklands Heights Business Park, Surrey, TQ070624, off *Pinus nigra*, 22.v.2009, discovered here new to Britain by Jonty Denton. *Stereocorynes*

truncorum (Germar) (Curculionidae), Rowley Woods complex, Buckinghamshire, TQ0082, 1.vii.2009, second Bucks site (after Langley Park).

Unna, S. E. – *Otiorhynchus porcatus* (Herbst) (Curculionidae), Camberley, Surrey, one in garden, 2010.

Hemiptera

Badmin, J. S. – Two *Acer* feeding leafhoppers, *Acericerus* (*Idiocerus*) *ribauti* Nickel & Remane and *Acericerus heydenii* (Kirschbaum) (Cicadellidae) were reported new to southern England in 2010 (P. Hodge, *pers. comm.*). Both species were recorded in low numbers from widely scattered localities in Kent (VCs 15 & 16) confirming their foothold in the South-East. *A. ribauti*, Faversham, E. Kent, 11.ix.2010; Westerham, W. Kent, 13.ix.2010; *A. heydenii,* Faversham, Kent, 5.ix.2010; Dover, Kent, 24.ix.2010. Native *Acericerus* (*Idiocerus*) *vittifrons* (Kirschbaum) included for comparison, Faversham Creek, E. Kent, 24.ix.2010 and Aveton Gifford, S. Devon, 20.x.2010, first Devon record.

Bantock, T. – *Macropsis megerlei* (Fieber) (Cicadellidae) (Plate 12, Fig. 8), Morfa Harlech, Gwynedd, North Wales, SH574303, VC48, 5.vii.2010, two males and one nymph on *Rosa spinosissima*, new to Britain.

Dickson, R. J. – *Nysius thymi* (Wolff) (Lygaeidae), Sinah Common, Hayling, SZ6999, S. Hampshire, (VC11), 14.vi.2010, locally common on the ground amongst lightly vegetated sand-hills; *Syromastes rhombeus* (L.) (Coreidae), Browndown coastal ranges, SZ5799, S. Hampshire, (VC11), 16.vii.2010, a nymph found on Nottingham Catchfly at night, from which this adult was bred; *Idiocerus ustulatus* (Mulsant & Rey) (Cicadellidae), Browndown coastal ranges, SZ5799, S. Hampshire, (VC11), 27.v.2010, ♀♀ common on white poplar; *Paramesus obtusifrons* (Stål), (Cicadellidae), Fareham Creek, SU5805, S. Hampshire, (VC11), 19.vii.2010, sweeping amongst *Scirpus* and *Atriplex; Eupelix cuspidata* (Fabr.) (Cicadellidae), Botley Wood, SU5410, S. Hampshire, (VC11), 19.vii.2010, by sweeping.

Flanagan, J. – *Conostethus venustus* (Fieber) (Miridae) (Plate 12, Fig. 7), Centenary Park, Rotherham, S. Yorkshire, VC63, SK42059201, 31.v.2010, flower-rich flood-bank along River Don, new to Britain; *Fieberiella septentrionalis* Wagner (Cicadellidae), Wath upon Dearne, S. Yorkshire, VC63, SE44030130, 12.viii.2010, brownfield site on *Salix* sp., new to Britain; *Drymus latus* Douglas & Scott (Lygaeidae), Thorpe Marsh, Doncaster, South Yorkshire, VC63, SE5908, single male swept from margin of dry grassland, first modern record from Yorkshire.

Wilson, M. R. & Kirby, P. – *Anoterostemma ivanhofi* (Lethierry) (Cicadellidae), Brighouse Bay, Kirkudbright, Galloway, NX631451, VC73, 20. vii.2010, and three further localities close to Brighouse Bay on 3.viii.2010, sweeping *Juncus gerardii* on salt marsh, new to Britain and western Europe (previously recorded from Ukraine and northern Italy).

Hymenoptera

Dickson, R. J. – *Ophion ventricosus* Gravenhorst, Denny Wood, New Forest, SU3306 S. Hampshire (VC11), 21.v.2010, c.5 to mv light; *Stenamma debile* (Foerster), Botley Wood SU5409, S. Hampshire (VC11), 2 ♂♂ 18/20.ix.2007 and 1♂ 20/22.ix.2007, Malaise trap, leg. K.J.Wheeler; *Nematus fagi* (Zaddach), Denny Wood, New Forest, SU3306 S. Hampshire (VC11), 21.v.2010, mv light and Hen Wood near West Meon SU6522, S. Hampshire (VC11), 25.vi.2010, mv light; *Micronematus monogyniae* (Hartig), Brownwich cliffs SU5302 S. Hampshire (VC11),

23.iv.2010, sweeping; *Cimbex connatus* (Schrank) (Plate 12, Fig. 4) Fareham, SU5707 S. Hampshire (VC11), larva on pavement below *Alnus cordata* 27.viii.2009, leg. Joan Dickson, adult emerged 3.vi.2010.

HALSTEAD, A. J. – Some uncommon or local Symphyta taken in 2010. *Acantholyda erythrocephala* (L.) (Pamphiliidae) (Plate 12, Fig. 5) female swept from a wooded meadow margin 14.v.2010, nr Wisley Village, Surrey TQ072598 – a Scots pine species that is more frequent in Scotland, possibly a first record for Surrey; *Xiphydria longicollis* (Geoff.) (Xiphydriidae) (Plate 12, Fig. 3) flew into my house! 3.vii.2010, Knaphill, nr Woking, Surrey, SU964587; *Janus femoratus* (Curtis) (Cephidae) female and *Aneugmenus fuerstenbergensis* (Konow) (Tenthredinidae) male swept 31.v.2010, Chinthurst Hill, nr Wonersh, Surrey TQ013458; *Empria parvula* (Konow) (Tenthredinidae) male swept 30.v.2010, Hackhurst Down, nr Gomshall, Surrey TQ095488; *Macrophya albipuncta* (Fallén) male and female, and *Nematus stichi* Enslin (Tenthredinidae) female swept 4.vi.2010, in lush meadow, W of Enochdu, E. Perthshire, NO016638; *Pristiphora groenblomi* (Lindqvist) male and *Nematus frenalis* Thomson (Tenthredinidae) male swept 8.vi.2010, Ben Vraikie (380m), nr Moulin, E. Perthshire, NN939607; *Nematus flavescens* Stephens (Tenthredinidae) female swept 7.vi.2010, Kindrogan Field Centre, Enochdu, E. Perthshire, NO062625.

HAWKINS, R. D. – Reared specimens of the sawfly *Zaraea aenea* (Klug) (Plate 12, Fig. 2). Three plump white larvae were beaten on 20.v.2009 from snowberry, *Symphoricarpos albus*, growing in the garden of the United Reformed Church in central Croydon, Surrey (TQ330656). They were each placed in a small plastic box and put aside in a cool place for the winter. By 2.iv.2010 all three larvae had produced an adult female of *Z. aenea*. This species was first recorded in Britain from a garden on Dartmoor in 1947, and there have been few further records since then.

MERRIFIELD, K. & R. – *Dryinus collaris* (L.) (Dryinidae) (Plate 12, Fig. 1). A female of this rare species taken at the Dipterists Forum Spring Field Meeting at Highstanding Hill, Windsor Forest, SU9374 Berkshire (VC 22), 22.v.2010. There are three previous records, all from Surrey; two date from 1900, but without supporting specimens, and the third, a female, was collected in a Malaise trap on Banstead Downs in mid-June 2000. It is a parasitoid of planthoppers in the family Cixiidae.

WALTERS, J. – Album of photographs taken in 2010 at Bovey Heathfield, South Devon, showing nest-pots of the Heath Potter Wasp *Eumenes coarctatus* (L.) and the wasps building pots, egg-laying and provisioning the pots; also an aerial photograph of the site showing the 169 locations where a total of 213 pots were found.

WHEELER, K. J. – (1) A sample of pompilid spider-hunting wasps from VC 11 South Hampshire. *Anoplius viaticus* (L.) female Denny Wood, SU3306, 27.iv.2010; *Anoplius caviventris* (Aurivillius) female Botley Wood, SU5410, i.ix.2010, a rare stem-nesting wasp; *Dipogon variegatus* (L.) female Botley Wood, SU5410, 17.v.2010, emerged from a trap nest; *Agenioideus cinctellus* (Spinola) female Botley Wood, SU5410, 24.v.2010, from trap nest; *Episyron rufipes* (L.) female Sinah Common, Hayling Island, SZ6999. 3.vi.2010; *Pompilus cinereus* (Fabr.) female Sinah Common, SZ6999, 14.vi.2010; *Priocnemis coriacea* (Dahlbom) male Botley Wood, SU5409, an uncommon vernal species.

(2) A sample of solitary bees from VC 11 South Hampshire & VC 13 West Sussex in 2010. *Andrena clarkella* (Kirby) female, Rewell Wood (VC 13), SU978074, 18.iii.2010; *Andrena apicata* (Smith) female, Rewell Wood, SU978074, 18.iii.2010, a scarce bee; *Andrena haemorrhoa* (Fabr.) female, Denny Wood (VC 11), SU3306, 5.iv.2010; *Andrena nitida* (Müller) female, Brownwich Cliffs (VC 11), SU5103, 13.iv.2010; *Andrena cineraria* (L) female, Westbury Park (VC 11), SU6523,

10.v.2010; *Eucera longicornis* (L.) male, Bishops Waltham (VC 11), 3.vi.2010; *Coelioxys conoidea* (Illiger) female Hayling Island (VC 11), SZ6999, 21.vi.2010, a local cuckoo bee.

Neuroptera

Plant, C. W. – *Peyerimhoffina gracilis* (Schneider) (Chrysopidae), Chigwell Row, South Essex, 2.xi.2010, leg. C. W. Plant (Plate 12, Fig. 6). This represents the fourth British locality for this lacewing which was added to the British fauna during 1999 (*Entomologist's Record* **113**: 131–135).

General

Kemp, R. J. – Mycophily – a new science for insect conservation. Mycophily is defined as the association of fungi with living plants and animals. The exhibitor's recent article in *Antenna* **34**: 13–15 (2010) was displayed in which the author discusses some of the 500+ papers published on the association of fungi with insects. Endophytic fungi that live inside plants may have beneficial or detrimental effects on insect herbivores depending on the species and host involved though their presence is not obvious to the human eye. The proposal is that some of these fungi may provide essential nutrients to enable insects to complete development and this may be an overlooked factor important for conservation.

Parsons, M. S. – Butterfly Conservation: a selection of draft maps, from the Hepialidae to the Geometridae, from the forthcoming *Provisional Atlas of the UK's Larger Moths*. Also posters covering a small selection of aspects of the projects that have been undertaken by Butterfly Conservation in recent years, including effort on the Heath Fritillary *Melitaea athalia* (Rottemburg), High Brown Fritillary *Argynnis adippe* (D. & S.) and the Mistletoe Marble Moth *Celypha woodiana* (Barrett). Also a selection of leaflets and reports recently produced by Butterfly Conservation covering a range of topics from general moth leaflets (as part of the Moths Count project) to leaflets covering specific foodplants.

Revels, R. – A display of 200 stunning photographs of British insects, ranging from butterflies and moths, to beetles, flies, wasps and dragonflies. Some pre-adult stages were shown and some in-flight shots using high speed flash photography. Also exhibited were the results of monitoring the parasitoids emerging from wild Holly blue butterfly larvae collected in Bedfordshire from 1990 to 2005, and published in *British Wildlife* magazine in August 2006.

Stubbs, A. E. – Buglife news: A selection of attractive invertebrate habitat posters, including a new one titled 'Ponds and Lakes'. Details of the proposed national Bee Lines Project, planting of bee-attractive flowers in 300m wide strips to link habitats across the countryside. Literature on 'Action for Scottish Invertebrates', and 'Conservation of brownfield sites in Northern England and Scotland'.

THE IMPACT OF ARTIFICIAL LIGHT ON INVERTEBRATES

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Summarised by Suzannah Dangerfield and Colin Bonnington

Abstract

It has long been of concern to conservationists that artificial light may disrupt ecosystems, with impacts on invertebrates manifold. This is particularly worrying when you consider that invertebrates constitute the majority of biodiversity on earth and are vital components of ecosystems. The distribution and intensity of artificial light has increased in the last few decades and its growth is continuing largely unchecked. Here we review the existing literature on the impact of artificial emitted, polarised and reflected light on invertebrates and identify aspects of the issue which require further research. Artificial light has the potential to significantly disrupt ecosystems, for example by altering natural light/dark (diel) patterns which the majority of invertebrates depend on for essential survival activities and, by attracting (or repulsing) invertebrates, which may affect a host of life-history traits, including survival and fecundity rates. Although further research is required to fully understand the impacts of artificial light on invertebrates and the environment as a whole, the precautionary principle should apply and there is sufficient knowledge to warrant immediate action. This review makes several recommendations, including artificial lighting being kept to a minimum, certain types of light being avoided, areas with natural or near-natural lighting regimes being officially protected against artificial light pollution, sources of polarised light pollution being identified and reduced and the affects of reflected light being fully considered (e.g. avoidance of attractant colours on man-made structures). These considerations will reduce and mitigate the negative effects that artificial light have on invertebrates.

Introduction

Light has been produced and manipulated by humans for a long time, from artificial light produced by burning substances (e.g. oil and wood) up until *c*. 150 years ago to the spread of fluorescent lighting in the 1940s. Developments in lighting technology in recent decades have led to a global surge in outdoor lighting, in areas of both urban and rural expansion. Artificial night lighting is used for a number of purposes in rural and urban areas, including security, safety and amenity, with light from sport facilities, commerce and retail being some of the most significant sources of light pollution (DCLG, 1997). There have been growing concerns into the impacts of artificial lighting on the environment in recent years, with several studies documenting the negative effects of lighting on vertebrates (e.g. avian populations Bruderer, Peter & Steuri, 1999, Miller, 2006, Molenaar *et al.*, 2006; reptilian populations Bertolotti & Salmon, 2005, Lorne & Salmon, 2007; amphibian populations Buchanan, 1993; mammalian populations Kuijper *et al.*, 2008). Despite these concerns, there is little substantial scientific research into the nature of effects on invertebrates, which is surprising, particularly when it is recognised that invertebrates are vital to ecosystems (Brusca & Brusca, 2003).

Light detection by invertebrates

The complexity and capability of light-sensitive structures varies considerably in the invertebrate world, from the simple nerve fibres of some sea urchins that respond to changes in light levels to the sophisticated eyes of jumping spiders that are able to focus images. The eyes of arthropods, molluscs and some worms are very sensitive and these invertebrates are perhaps the most affected by changes in light. Most invertebrates have a colour vision system that is based on three or four, sometimes five types of colour receptor cells (Gullan & Cranston, 2005). Light wavelengths are measured in nanometres (nm) and most invertebrates can perceive the spectral region from ultraviolet (UV) which has a short wavelength and high frequency (300 nm) to red which has a long wavelength and a low frequency (700 nm) (Arikawa, Inokuma & Eguchi, 1987). UV light is used by terrestrial invertebrates in a variety of activities such as mate selection, navigation and foraging (Salcedo *et al.*, 2003). UV, green and blue light which have short wavelengths and high frequencies are best discriminated by invertebrates and they are often much more sensitive to these wavelengths than humans are; while invertebrates are generally insensitive to the red end of the spectrum (Ashfaq *et al.*, 2005). However, there are exceptions to this as some aquatic invertebrates (and biting flies) are more sensitive to red light than other invertebrates (Heise, 1992). Some invertebrates can detect light at very low levels. For example, nocturnal hawkmoths have large and sensitive superposition compound eyes. Their sensitive eyes allow them to see in colour even at very low light intensities that are roughly equivalent to starlight. Like humans, invertebrates with apposition eyes, such as bees, become colour-blind in dim light (Kelber, Balkenius & Warrant, 2002).

Many invertebrates depend on the natural rhythms of day–night and on seasonal and lunar changes in light levels to trigger vital stages in their life-cycles such as oviposition (egg-laying), emergence and diapause (suspended development). For example, some species of invertebrate complete their life-cycle within a lunar cycle of 28 days. The presence or absence of moonlight provides a trigger for the beginning or end of each life-cycle. Some invertebrates, such as flying adult mayflies, can become disorientated by artificial light and fail to successfully perform important aspects of their life-cycle (Nowinszky, 2004). It is likely that such disruption to essential life events would lead to local extinctions of species and a reduction in abundance and biodiversity.

Methodology

Although there is considerable anecdotal evidence of the deleterious effects of light pollution on invertebrates, surprisingly little information on the actual effects on species and populations has been published. The majority of the available literature focuses on the effects of emitted light on nocturnal invertebrates (especially moths), with limited regard paid to other invertebrate groups, and also to the effects of polarised and reflected light on invertebrates. A review assembling the existing literature on the impact of artificial night lighting on invertebrates is timely. Most of the literature reviewed is from peer-reviewed publications (both UK-based and international), and was obtained using web-based searches. Areas where additional research is required are identified, and recommendations into reducing the affect of artificial light on invertebrates and the wider environment are presented.

RESULTS

Attraction to artificial light

Artificial lighting attracts many invertebrates, including moths, beetles, flies, leafhoppers, dragonflies, butterflies and wasps (see Frank, 1988; Eisenbeis & Hassel, 2000; Nakamura & Yamashita, 1997), with ultra-violet (UV), green and blue light, characterised by short wavelengths and high frequencies, the most attractive. The distance that invertebrates are attracted to light varies greatly depending on other environmental factors and on the species. Moths are known to fly to light from 3–130 m, but greater distances ($\geqslant$500 m) for some species have been reported (Frank, 2006). Artificial light may affect moth breeding and feeding behaviour, with local moth extinctions reported as a result of continued exposure of the moth population to artificial light (Väisänen & Hublin, 1983). Similarly, Eisenbeis (2006) documents that one-third of flying invertebrates attracted to artificial lighting (street lights) may die, as they collide with the hot light or become disorientated and exhausted increasing their susceptibility to predation.

Some bat species (noctule *Nyctalus noctula* (Schreber) and common pipistrelle *Pipistrellus pipistrellus* (Schreber)) feed on invertebrates attracted to artificial night lighting (Rydell, 1992; Blake *et al.* 1994). In addition, mercury vapour street lights interfere with the moth's ability to detect the ultrasonic sound bursts used by echo-locating bats, which increases the predation rate (Svensson & Rydell, 1998). Other predatory animals, including other mammals (Outen, 2002), amphibians (Baker, 1990), reptiles (Frank, 2006) and spiders (Milius, 1999) have all been documented as feeding on invertebrates attracted to artificial lighting. Furthermore, moths and other invertebrates attracted to night lighting often rest on surfaces close to the light source during the day, where they are vulnerable to predation (Feltwell, 1996).

Artificial lighting can affect moths in a number of ways, including disturbance to their navigation, vision, egg-laying, mating, feeding and camouflage (Frank, 1988). In Britain, two-thirds of the 337 moth species which have sufficient monitoring data to determine population trends, have decreased over the last 35 years. Light pollution is considered as a possible contributing factor for these declines, although it is difficult to separate the impacts of artificial lighting from other impacts of urban development, such as habitat loss and air pollution (Fox *et al.*, 2006).

Aquatic invertebrates are also influenced by artificial lighting, with riverflies (Orders: stoneflies [Plecoptera], caddisflies [Trichoptera] and mayflies [Ephemeroptera]) the most prominent affected. Riverflies and other aquatic invertebrates are a vital part of the freshwater ecosystem and are an important food source for birds, fish and other animals. Concern has been raised that increasing intensity and distribution of lights across Britain appears to be affecting riverfly breeding and survival (Craig Macadam, Ephemeroptera Recording Scheme, *pers. comm.*). Many riverflies depend on specific environmental cues for adult emergence and artificial lighting can interfere with these crucial cues. The larvae are generally repelled by light (Heise, 1992) but adult riverflies are attracted to artificial night lights and may become disoriented around them (Rich & Longcore, 2006). High incidences of riverfly mortality around artificial light sources near the riverbanks have the potential to cause population declines (Craig Macadam, *pers. comm*).

Many types of marine invertebrate, such as late-stage crab larvae, are attracted to artificial light (Porter *et al.*, 2008). Lights from the shore, boats and gas flares could disrupt marine invertebrates in the performance of activities vital to their life-cycles, such as feeding and breeding and increase their susceptibility to predation.

Polarised light pollution, created by light undergoing linear polarisation by reflecting off smooth surfaces or by dispersal in the atmosphere or through water, attracts many invertebrates, such as beetles and dragonflies. Artificial lighting can increase levels of polarised light pollution. Adult mayflies are attracted to sources of polarised light, as these sites signify a water surface on which these invertebrates breed and lay eggs. Artificial sources of polarised light (e.g. road surfaces and solar panels) can attract egg-laying mayflies, but the laid eggs do not develop on such surfaces (Horváth *et al.*, 2009).

Many invertebrates are attracted to light reflected off coloured artificial surfaces; with for example, diurnal pollinators attracted to yellow objects and crepuscular invertebrates attracted to white or pale grey objects (Long, Flint & Lepper, 2010). Most attraction, for instance pollen beetles attracted to a yellow t-shirt, is likely to be very localised and, while the affected animals may waste some energy in futile activity, there is unlikely to be any significant ecological impact. However, there may be exceptions to this, large objects may attract many invertebrates from a considerable distance; if combined with an increased risk of fatality then there could be significant ecological impacts. In particular a recent study has strongly suggested that pale grey wind turbines have the potential to attract invertebrates at dusk and the suggestion is that this could in turn attract increased numbers of their predators, resulting in increased fatality of bats and possibly birds as well (Young *et al.*, 2003; Long, Flint & Lepper, 2010).

Repulsion from artificial light

Species, such as woodlice, earthworms and scorpions are repelled by light (Camp & Gaffin, 1999; Hassall, Zimmer & Loureiro, 2005) and it is likely that increased light levels will reduce the survival probability of invertebrates that inhabit dark areas (Feltwell, 2003). Zooplankton migrate from deep water to the surface at night to avoid predation from animals, such as fish. Increased surface light pollution was found to prevent *Daphnia* (water fleas) from migrating to the water's surface at night. This could prevent *Daphnia* from grazing algae in the upper part of the water column, causing an algal bloom and the subsequent lowering of the water quality (Moore *et al.*, 2000).

Macro-invertebrate species such as some aquatic midge larvae and shrimps exhibit pronounced avoidance of even dim light. This behaviour is possibly a way in which they protect themselves from predation by fish which select for larger prey as light levels decrease. Artificial light can confine these species to cold, deep waters where food is less abundant and where their growth is slow, which could reduce their populations (Moore Kohler & Cheers, 2006). It is possible that invertebrates that are repelled by light will not use large areas that are illuminated by artificial lighting. The proliferation of such 'no-go' areas through an increase in outdoor lighting could lead to the fragmentation of habitats, and isolation of populations. Small isolated populations might not be viable in the long term, which could ultimately lead to local extinctions and reduce gene flow between populations.

Impact of artificial lighting on dormancy

Invertebrate development from egg to adult is often interrupted by a period of dormancy when conditions become unsuitable, such as in very high or low temperatures or during drought. Dormancy may involve quiescence (where development is halted or slowed in response to unfavourable conditions and

development continues when conditions become favourable again) or diapause (where arrested development occurs along with adaptive physiological changes and development continues only when particular physiological stimuli are triggered) (Gullan & Cranston, 2005). Day length (photoperiod) is the primary environmental stimulus involved in the regulation of invertebrates' life cycles and is significant in regulating diapause. Hayes *et al.* (1970) found that day length extended by artificial light prevented European corn borer larvae (*Ostrinia nubilalis* (Hübn.)) and codling moth larvae (*Cydia pomonella* (L.)) from entering diapause. In such circumstances non-diapausing invertebrates would not survive the extreme conditions of winter, and this could lead to local extinctions.

Impact of artificial lighting on migration

Changing the natural day–night (diel) cycles of invertebrates can affect dispersal and migration. Disruption of the circadian clock (the 24-hour rhythm) of monarch butterflies (*Danaus plexippus* (L.)) using artificial light has been shown to interfere with their orientation direction during migration (Froy *et al.*, 2003). It is also likely that artificial lighting could affect invertebrate migration and movement on a more local scale too, interfering with local dispersal and meta-population connections. Some flying invertebrates are attracted to the lights around sea- and air-ports. These invertebrates may rest on boats and planes and be transported to other regions and countries where they can become a pest (Wallner *et al.*, 1995). This form of artificial migration could be costly both in economic and environmental terms.

Impact of artificial lighting on activity levels

Artificial light at night has the potential to confuse invertebrates and change their natural levels of activity at night. Artificial light could also change the speed of development in invertebrates. A high general level of illumination at night caused by artificial lighting can cause night flying invertebrates to cease flying and settle as if it was sunrise. This prevents them from performing normal nocturnal activities such as feeding and breeding. It has been found that Corn earworm moth (*Helicoverpa zea* Boddie) activity in a bioclimatic chamber was suppressed by light intensities as low as 0.1 lux (less than a fifth of full moonlight) and that field oviposition rates were significantly reduced at times of full moon (Nemec, 1971).

A study looking at larvae of the speckled wood butterfly *Pararge aegeria* (L.) showed that a higher growth rate associated with a longer photoperiod (as would be caused by artificial light) resulted in significantly higher predation on the butterfly larvae from the primary parasitoid species (Gotthard, 2000). It appears that artificial light can affect growth rate and can also affect the natural predator–prey balance, which although this may benefit a few species, is likely to negatively impact on many more.

Many diurnal invertebrates such as the wall brown butterfly *Lasiommata megera* (L.) and grayling butterfly *Hipparchia semele* (L.) have larvae that feed at night, a behaviour which helps them avoid predation. It is likely that artificial lighting will impact on the behaviour of nocturnal feeding larvae and will either make them much more susceptible to predation or inhibit their feeding. The larvae of riverflies and some other freshwater species exhibit a nocturnal pattern of movement called stream drift. Stream invertebrates and crustaceans hide amongst substrate during the day, but at night they will detach themselves and drift downstream eventually re-attaching themselves to the substrate. This allows movement to areas with less competition or

better foraging. By moving only at night they avoid predation from fish. Stream drift is cued by low light intensity; higher light levels, such as during a full moon (0.5–1 lux in clear conditions) can suppress stream drift. Artificial light can produce light levels far higher than the light level recorded under full moon, so it is likely that artificial light cast onto streams will prevent a significant amount of invertebrate stream drift. A reduction in stream drift could reduce species populations, inhibit dispersal to new areas and have other wider implications for steam ecosystems (Moore *et al.*, 2000).

In cave systems beyond the entrance zone there is no natural light; specialised species live in these permanently dark zones. In the UK there are several species of springtail, crustaceans and spiders that only occur in dark caves (Chapman, 1993). The introduction of artificial lighting into these areas, as is often associated with public access, dramatically changes cave ecology, enabling generalist species to invade the cave and out-compete the specialist species.

On the other hand, light pollution can result in diurnally active species becoming more active at night. Necrophilous flies do not normally lay eggs at night, but will do so if an area is illuminated by artificial light (Baldridge, Wallace & Kirkpatrick, 2006) and artificial nocturnal moonlight has a twofold influence on fruit flies: it shifts the circadian clock, and it increases nocturnal activity independently of the clock, making them become nocturnal (Kempinger *et al.*, 2009).

Impact of artificial lighting on bioluminescent behaviour

There is evidence that the glow-worm *Lampyris noctiluca* (L.) is declining in Britain and light pollution may be a contributory factor for this trend (Crowson, 1981). There have been anecdotal reports that male glow-worms are attracted to artificial lighting at night. A laboratory study showed that males respond to certain wavelengths of light, attracted to lights in the green to orange part of the spectrum (Booth, Stewart & Osorio, 2004). However, it is not known if artificial lighting significantly affects the breeding, mating success and population levels of glow-worms under field conditions. The distances over which males are attracted to lights or how they judge the size of a light source are also not fully understood. It is also thought, but not yet proven, that the efficiency with which males can detect female bioluminescence is reduced when the background environment is highly illuminated by artificial lighting. Female glow-worms generally do not start glowing until light levels have dropped below a certain point (Dreisg, 1971). Artificial light may prevent the stimulus that female glow-worms require to initiate glowing, or it might reduce the amount of time that they would naturally glow in a night which would then decrease the chance of a successful mating.

Impacts of artificial lighting on nectaring and pollination

Crepuscular invertebrates are most attracted to white flowers that have low ultraviolet reflectivity (White *et al.*, 1994; Johnsen *et al.*, 2006). Moon and starlight are significantly long wavelength shifted and hence red flowers are bright against green leaves. Light pollution has many spectral peaks and hence will affect the apparent colour and contrast of flowers at dusk and night. There is a clear possibility that pollination rates of flowers that are adapted to nocturnal visitors are affected by emitted light pollution (Johnsen *et al.*, 2006).

Discussion & recommendations

Actions to avoid, minimise or mitigate the impacts of artificial light pollution on wildlife

Legal obligation

The EU Communication from the Commission on the Precautionary Principle (2000) is relevant to minimising the effects of artificial light on the environment. All public bodies must consider the impact artificial light will have on biodiversity in the area, as a component of the Natural Environment and Rural Communities (NERC) Act 2006 in England and Wales and Nature Conservation Act 2004 in Scotland.

The potential for light pollution from a development (emitted and polarised light particularly, but in the case of large structures reflected light as well) should be considered at the scoping stage of all Environmental Impact Assessment processes. Light spill onto wildlife habitats should be avoided altogether where possible, but if necessary the impact should be considered as being likely significant and should be fully assessed in the Environmental Statement. The Environmental Statement should include a survey of species of conservation significance (e.g. Red Data Book listed species and UK Biodiversity Action Plan listed species) that may be sensitive to light. The scope of the survey will vary depending on location and habitats likely to be affected, but may include moths, glow-worms, other beetles and aquatic invertebrates. An experienced entomological consultant would be able to provide advice on the scope of the surveys. In addition, the Environmental Statement should include a visible light spill map that is clear and easy to interpret (i.e. shaded lux isolines (isophotes) that go at least as low as 0.5 lux), a comparable UV light spill map and, where relevant, a similar map of polarised light effects. A lighting plan should be provided that details the location, type, wavelength emittance and shielding of lights. The text of the Environmental Statement should detail areas of possible light pollution impact on invertebrates and explain how these impacts will be avoided, minimised and/or mitigated or compensated for. The aim should be for at least no net increase in light pollution on wildlife habitats.

When assessing the likely significance of impacts planners should bear in mind that light levels as low as 0.1 lux have been shown to affect invertebrate activity; that constant light pollution at or above the equivalent of full moon light (0.5-1 lux) can be expected to have a profound effect on many invertebrates; that invertebrates can be attracted to an unshielded light source from a distance of at least 500 m; and that UV light pollution will have an even bigger impact than visible light. The impacts of polarised light have not yet been adequately gauged in terms of intensities and distances, but polarised light sources within 500 m of water bodies, or that reflect light into that vicinity are of the greatest concern. Exposed surfaces that are white, pale grey or yellow are most likely to attract pollinating invertebrates. In England the 'Planning Policy Statement 23: Planning and Pollution Control' states the need to limit and, where possible, reduce the adverse impact of light pollution during the planning process.

Minimise the impacts of artificial lighting

When planning a new development (which may or may not require an Environmental Impact Assessment) or re-evaluating an old lighting scheme, the first point that should be considered is whether lighting is really necessary. Instead of assuming that light is automatically necessary, promoters of lighting schemes could consider whether, for example, there are alternatives to lighting, such as strong fencing for security purposes. If lighting is deemed necessary for a development, then several aspects of the lighting scheme must be considered to reduce the impact on

invertebrates and the environment, including the location and design. Installing the right kind of lamp and luminaire in the right location is very important in minimising the impact of lighting. Some of the most important habitats for invertebrates and wildlife are in, or close to cities, so the impacts of lighting must be considered in urban areas. In addition light pollution can also be created outside the planning system, such as the activities and behaviour of individuals (closing curtains and turning off lights in buildings will reduce light pollution). There are a number of key points related to reducing the impact of emitted light pollution, and these include the brightness/wattage of the lamp, number of lights used, wavelengths produced by the lamp (most invertebrates have a high sensitivity to short wavelengths), colour rendition, direction of light shine, period of lighting and the location of lighting.

Sources of polarised light pollution should be identified and diminished, and further research into the issue is timely. The use of agricultural sheeting and large areas of solar panelling in sensitive areas, particularly near water-bodies, should be limited, or sources of polarised light should be broken up by adding non-polarising patterns, areas or grids that block horizontal light. This approach, specifically using white borders and white grates has been shown to prevent invertebrates being attracted to solar panels (Horváth *et al.*, 2010a). Car parks should be located far enough away from rivers and other waterbodies so that aquatic invertebrates are not attracted to car surfaces for egg-laying. Asphalt road surfaces near waterbodies should not be smooth and dark. Asphalt can be made non-polarising by incorporating a rough top layer or white granules that scatter light (Horváth *et al.*, 2010b). New buildings should not include glass that produces horizontally polarised light.

As a precaution, large structures in the countryside, particularly in perilous situations such as wind farms, should not be painted with colours that attract invertebrates. It is well known that many pollinating invertebrates are attracted to surfaces of a particular colour. In particular, day flying species are most attracted to yellow surfaces, and white or pale grey surfaces attract crepuscular and nocturnal species. Structures painted with such colours are likely to divert pollinators away from flowers and also attract their predators. In the case of wind turbines this is likely to result in an increased mortality of invertebrates, birds and bats. More research is required to determine the likely magnitude of the effect and if high UV reflectivity can reduce attractiveness.

At present our understanding of the extent to which artificial lighting has an effect on invertebrates and the wider environment is poor. Some invertebrates, such as those with superposition eyes (e.g. hawkmoths) are sensitive to even very low light levels. While reducing artificial light and changing lamp types is often beneficial; it is recommended that places with natural or near-natural light regimes should be conserved and created (e.g. Galloway Forest Park is the first official Dark Sky Preserve where strict controls on light pollution are implemented). Artificial lighting should not be installed in natural cave systems. In existing show caves every effort must be made to minimise the amount of time that lighting is on and lamps with a narrow light range between yellow and red should always be used in all areas where colour perception is not necessary.

The role of public awareness in reducing artificial light pollution

The general public should be made more aware of the issues of artificial light pollution and the environment. The public can then understand and support positive changes made by public bodies to lighting schemes, and light polarisation or reflection effects. Raising awareness will also help reduce light pollution from private

residences. Most artificial light produced in Britain comes from industry and housing developments and from road and street lighting. Local authorities and the planning system have a major role to play in reducing the environmental impact of artificial light, but members of the public should also be aware of the issue.

Most domestic security lighting is purchased by members of the public who are not fully aware of the environmental impacts of lighting. Information on lighting types, installation and maintenance should be given prior to purchase to reduce the impact of these domestic lights on the environment. Retailers selling domestic security lighting should be properly trained and informed on the issues. Similarly there is currently low awareness of the negative impacts of solar-panel associated light polarisation on aquatic life and the readily implementable solutions to this threat.

Conclusions

Invertebrates make up the majority of biodiversity and they are vital to ecosystems. Artificial light in the wrong place at the wrong time adversely affects the life cycles and survival of invertebrates. This could have knock-on effects at a population level, contributing to declines and extinctions of species. Artificial light has the potential to significantly disrupt ecosystems and it has long been of concern to conservationists. It is widely observed that some invertebrates, such as moths, are attracted to artificial lights at night. Artificial lighting can significantly disrupt natural light/dark patterns. Many invertebrates depend on the natural rhythms of day-night and seasonal and lunar changes to light levels. As a result, artificial lighting has several negative impacts on a wide range of invertebrates, including disrupting their feeding, breeding and movement, which may reduce and fragment populations. In addition the polarisation of light by shiny surfaces is a significant problem as it attracts aquatic invertebrates, particularly egg-laying females away from water and reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates.

As invertebrates are so fundamentally important to healthy ecosystems and because declines and threats mean that many species are already listed as national priority species for conservation under the UK Biodiversity Action Plan (UKBAP), it is imperative that avoidable threats to their well-being are avoided. Although further research is required to fully understand the impacts of artificial light on invertebrates and the environment as a whole, the precautionary principle should apply and there is sufficient knowledge and information to warrant immediate action. This review makes several recommendations that would reduce and mitigate the negative effects that artificial light has on invertebrates.

Local authorities and Government departments must take a lead on reducing the impact of artificial light. The environmental impact of light for new developments must be more prevalent in the planning process and more routinely part of the Environmental Impact Assessment process. Public bodies have a ‘biodiversity duty’ under the NERC Act 2006 and Nature Conservation (Scotland) Act 2004 and must consider the impact that lighting, polarisation and reflection will have on biodiversity.

Light pollution levels should be generally reduced everywhere. However, it is particularly important that areas that currently have low lighting levels and areas that are important for wildlife should be identified and the potential for these areas to become Dark Sky Preserves investigated. Established lighting schemes should also be reconsidered to reduce their impact on the environment. In addition, the issue of

artificial light and its environmental impacts on invertebrates and other wildlife should be given a greater public profile.

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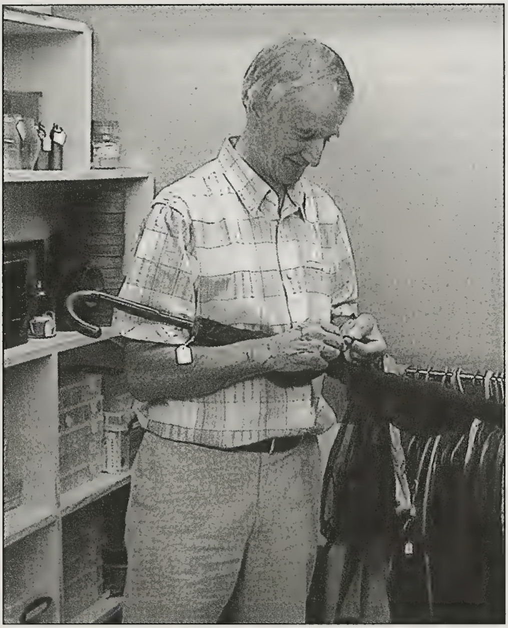
SHORT COMMUNICATION

***Evergestis limbata* (L.) (Lepidoptera: Pyralidae) in North Hampshire**. – On 24 June 2005, I caught a pristine adult pyralid moth which I did not recognise in a Robinson light trap, in the garden of my then home *Kingsmead* in Medstead (SU6437); this was photographed and released, and only positively identified by Graham Collins as *E. limbata* in May 2011! On the night of the 26 July 2011, I trapped for the first time in over three years, this time in my garden in Four Marks (SU671349), and caught another albeit more worn individual of this species. Given that the moth has yet to be found in Surrey, it is tempting to surmise that my hit rate (two in six trap nights) in gardens a little over 2km apart, may be indicative of a locally established population. – JONTY DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

OBITUARY

Malcolm Simpson
1940–2010



Malcolm Simpson who died in December 2010 will be best remembered for his interest in entomological equipment and the 'Simpson Collection of Entomological Memorabilia'.

He was born during the war to Scottish parents, and could remember his house being bombed and strafed by a German fighter plane as he and his brother played on the beach at Carnoustie. He was brought up in a strictly religious family and had a very happy childhood in Wealdstone, north-west London.

He enjoyed being outside and after being given '*The Observer's Book of British Butterflies*' by a Scottish aunt at the age of eight he never looked back on his fascination with butterflies. His parents were friendly with a neighbour who owned a bungalow at Pett Level in Kent, and they spent many summer holidays there in the late 1940s. During this time Malcolm discovered several species that were new to him but was often unsuccessful at catching them with his fishing net. His experiences of insect life were widened at this time by a visit to the self styled 'Butterfly King', Ben Bennett, near to where they were holidaying, in the village of Alfreston in Sussex. A band leader travelling the world on cruise ships, he compiled his collection while ashore. More magnificent insects were to be seen at the collections of Lord Rothschild at Tring a little later, but the greatest impression was created on the youngster when he visited 'The Festival of Britain' in 1951. The exhibition of static and live displays by L. Hugh Newman at this event perhaps caused the young Malcolm to abandon many of his other schoolboy interests in stamps, coins and cigarette cards and concentrate on butterflies.

He was to go on to meet L. Hugh Newman on several occasions at the 'Boys Own Exhibition' held annually at the Horticultural Halls, Westminster but never made the journey to see his Butterfly Farm at Bexley. He did though, order his first real butterfly net (for ten shillings, 50p), the cheapest cane ring net available and a few pill boxes. This treasured piece of equipment arrived in the post (seven and a half pence extra) just prior to a holiday in Scotland. The journey in their pre-war Austin 10 took two days with an overnight stop at an aunt's house in Leeds. One of the refreshment stops en route was taken just north of Newark, when he felt the net had justified all the expense when he was able to take his first Speckled Wood. His mother was very long–suffering over his hobby but in the end she refused to clean or even open the door of his bedroom as Malcolm always had some live insect or other flying around, or being bred.

He spent hours as a teenager in Watkins and Doncaster (W&D) in the Strand, and as much time as possible in the Natural History Museum in London even though this meant cycling into Central London from his home now Pinner, some 18 miles away. So keen was he to get there that he did it in one hour of hard pedalling. During his time at W & D he was impressed by the collections, equipment and knowledge of the many naturalists he met such as Laurie Christie, Captain Greenop, Mr R. L. E. Ford and Lt. Col. F. C. Fraser. This last kindly gentleman he was to get to know over a number of years, collected cicadas and dragonflies in India. He told Malcolm that many of the cicadas in his collection could only be taken in flight or out of trees by the careful use of his shotgun and their wings had the holes to prove it. To a fifteen year old the combination of all this was overwhelming. Although he did purchase some insects he was often found delving into a large trunk situated under one of the windows. This trunk was known as the 'bargain box'. Store boxes, nets, setting boards and a multitude of collecting equipment in various stages of disrepair could be had for a few coppers. Malcolm has admitted that perhaps in those early years his interest in old collecting apparatus was born. Often he has said how he enjoyed the musty, cabinety, insecty, smell mixed with naphthalene vapours that lingered on his clothing, hands and any item he took home from W&D or Janson's. It was the kind of smell that occasionally can still be savoured from the insect departments of museums.

Malcolm loved his schooldays and excelled at sport. He was an outstanding schoolboy cricketer and was asked to trial for the M.C.C. but he never told his parents and so never took up the offer. The cricketing expertise stayed with him and he continued to play for many years after his marriage. His children and grand-daughters have inherited his love of the game and both grand-daughters play for the Huntingdon girls' team.

Sadly he did have to dispose of his precious collection of butterflies and collecting equipment on returning from honeymoon penniless in March 1963. This led to a complete hold on Malcolm's interest in butterflies and as the family grew and Malcolm's career responsibilities increased the hobby was put on the back burner. Fortunately the opportunity to take up his interest again presented itself while on holiday in Cornwall in 1973 when his two sons, without any prompting from their father, spent their daylight hours catching butterflies with their fishing nets.

Over the next few years Malcolm, perhaps keener and stronger in purpose returning to entomology, was influenced by friendships with several collectors, amongst them Don Russwurm and Graham Howarth. They had much to tell and show of insect collecting over probably the major part of the last century. It opened his eyes to the wide variety of collecting equipment once in widespread use but even then becoming scarce and his appetite was whetted to concentrate more seriously on

the preservation of the material. In many ways Malcolm had also become increasingly concerned about the protection and conservation of our Lepidoptera but what was the best way forward? Perhaps because of legislation and some changing attitudes there was less interest in amateur entomology and all its trappings, whereas reducing pollution and habitat destruction was really where the efforts should really be directed, rather than to discourage the activity and contribution by amateur entomology to the knowledge of our Lepidoptera and other insect orders.

In 1980 he decided to place an advertisement in the May issue of the Amateur Entomologists' Society 'Wants & Exchange' List requesting unwanted pre-1972 trade catalogues to prevent them finding their way to the scrap heap. He had only one response, that of Michael Chalmers-Hunt, who being a like minded soul was to become a great help to Malcolm in his quest, but this was still a frustrating start to his collection. However, he has said that his journey through the entomological history of collecting was very rewarding, and without exception found entomologists to be very supportive, generous and more than willing to help him preserve material that is of historic value and interest.

To some extent he always relished the history and story of each item he has inherited. One of his exciting moments in recent times has been the discovery at the Hope Museum in Oxford of some remaining fragments of the variously called, bat-fowler's net or clap net (Simpson, 2006). Indeed Michael Chalmers-Hunt had been searching for many years unsuccessfully for one which might have survived. It seems strange that until these parts of the net were found no other bat-fowler's net, which was probably first used around the 1700s, and had been mentioned and illustrated in many publications until well into the middle of the 19th century, had been tracked down. This net was restored by Malcolm with his usual meticulous care and attention to detail. If there were such a thing as the 'King of nets' surely this would be it.

I have drawn on some notes Malcolm made of his collection (Simpson, 2007) to tell just a little of the story of his interest in the history of entomological and collecting equipment. I trust I have covered enough of his busy life to do justice to it. He was a member of the AES since the early 1950s, the British Entomological and Natural History Society and recently a Fellow of the Royal Entomological Society. It is perhaps fitting that the restored bat-fowler's net will return to the Hope Museum in Oxford where it will be on show with other collecting equipment and the BENHS has agreed to have the 'Simpson Collection of Entomological Memorabilia' on display at Dinton Pastures.

His funeral on 30 December 2010 was so well attended by family, friends and colleagues from all his interests and the societies to which he belonged that there was standing room only for most of those who came. Malcolm had a great sense of humour, a very warm personality and was always ready to help people in any way that he could. Indeed he was truly one of nature's gentlemen. Malcolm will be sadly missed by us all, but in particular by his wife Pam, sons Stuart and Ian and families.

David Oram

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FIELD MEETINGS

RSPB Rainham Marshes, Essex 5 June 2010

Leader: **Jim Archer**. – The main aim of this trip was to investigate the silt lagoons at Rainham Marshes. The RSPB reserve at Rainham Marshes occupies a former MOD firing range, parts of which, at one time, were leased for grazing. It has been developed as an urban nature reserve, with particular attention paid to involving the local community, so, for example, as well as providing hides and classrooms, it allows local people to enter free and there is an extensive children's playground. At the west end of the reserve, next to the large Cleanaway landfill site, are silt lagoons, formed from Thames dredging, which are also in RSPB care and managed by cattle grazing. These are not normally open to the public, but in the summer of 2005 Peter Harvey surveyed their aculeate Hymenoptera, reporting 60 species, including six Red Data Book species. We advertised this meeting as having a particular slant towards Hymenoptera but hoped for information on other species.

The meeting was attended by Tony Allen, Graham Collins, Martin Collier, Matthew Gandy, Grant Hazelhurst and Seth Irish. June 5th began as the then hottest day of the year. Bird watchers sometimes have difficulty with entomologists' methods of identifying wildlife but the staff carefully overlooked the nets swishing amongst the hedges round their picnic tables and rushed to offer caps to protect us from the sun. It is a good 30 minute walk from the RSPB centre to the silt lagoons: Matthew Collier took a number of photographs of the reserve and the walk along the Thames created so much interest that I wondered if we would actually reach the Lagoons gate. The area looks hillocky and dry but Seth stopped, bare arms outstretched at a pool by the gate, catching mosquitoes. The larvae which he subsequently reared were identified as *Aedes caspius* (Pallas) and *A. detritus* (Haliday), both typical of brackish water and salt marshes. They have fearsome biting reputations so I am not sorry we came early in the year. He also took adults of *A. flavescens* (Müller) and a female of *A. annulipes* (Meigen). Meanwhile the rest of us scattered across the grass and thistles. Matthew photographed a number of moths, three of which – *Elachista argentella* (Clerck), *Aethes tesserana* (D.&S.) and *Eucosma metzneriana* (Treits.) had not previously been identified on the reserve, a reminder both that we need to pay attention to more day flying moths and that there are differences between the silt lagoons and the more accessible parts of the reserve. Between them, Graham and Grant provided a fascinating list of insects from several Orders, including two new bees. It was particularly useful to be able to confirm the continued presence of the rare spider hunting wasp *Evagetes pectinipes* (L) and to be given an update on the status of the mining bee *Colletes halophilus* Verhoeff. In 2005, Peter Harvey was excited to find a colony on the Lagoons. Not only is it still there but it has now succeeded in spreading to other parts of the Thames estuary and is no longer quite so remarkable.

Our beetle hunters were the first to leave: they decided that the area between the Thames and its various sea walls looked too interesting to ignore. General opinion was that the silt lagoons are drying out and becoming a more 'normal' habitat. Another bout of Thames dredging is needed to change that. I was humbled by the level of entomological expertise available and the quality of some of the reports. The RSPB has an increased species list, an update on the state of its own land and a reminder of how much more about it there is still to be discovered. I am grateful to the various staff of the RSPB for the welcome they gave their unusual visitors and especially to Colin Bartholomew, the site manager at Rainham Marshes, for the

voluminous documents he made available to us and for allowing us access to such an interesting part of the Thames Estuary.

St Cyrus NNR, Kincardineshire, 20 June 2010

Leader: **Mark Young**. – The leader was joined by three local lepidopterists but regrettably no other members of British Entomology & Natural History Society, for what proved to be an excellent day's excursion to St Cyrus National Nature Reserve. This coastal dune and cliff system, just north of Montrose, is a very rich and attractive site, with slightly base-rich rocks and sand encouraging a varied flora and the sheltered, dry and sunny micro-climate resulting in a number of species finding their northern-most site there. It is renowned for its rare flowers and insects and never disappoints!

The party started mid-morning and worked slowly northwards from the car-park, along the cliff-base paths, and making for the rather remote and neglected northern bays. After lunch there, we then worked back along the sand-dunes, arriving back at the car park by late afternoon, having recorded over 80 species of moths and butterflies during this slow daytime ramble. After having a take-away supper in Montrose, the party then reconvened to run a light near the visitor centre, at which another 25 plus species were added. The day was generally bright and dry, whereas the clear evening then cooled down rather too quickly for good light-trapping.

The main purpose of the visit was to try and confirm the continued presence of some of the species for which St Cyrus is a key site, and also to confirm the presence of a species that is new to North East Scotland and which will surprise most southern readers! By day we recorded a huge array of species, dominated by the constant abundance of the Cinnabar, which was in unbelievable profusion at this almost northern-most east coast site. It was nice to see a few Northern Brown Argus butterflies and a Valerian Pug, but the main focus was on micro-lepidoptera and the local specialities, *Elachista subocellea* (Stephens), *Metzneria lappella* (L.) and *Hellinsia osteodactylus* (Zeller) were easily found, together with the locally scarce *Pempeliella dilutella* (D. & S.) and *Coleophora mayrella* (Hübn.). A feature of the sand-dunes slacks, in the late afternoon, were the myriads of *Celypha cespitana* (Hübn.). This species was already recorded from St Cyrus, but had often proved very elusive and to see hundreds together was quite impressive. A week later, other visiting lepidopterists struggled to find even one or two.

At light the Bordered Sallow, for which St Cryus is an isolated northern site, was a pleasant presence, but the main excitement was the arrival of a dozen or so Common Swifts! This species is recorded at scattered sites across Scotland but had never been confirmed in NE Scotland before Paul and Frank Brooks found one at St Cyrus the week before our excursion. Several previous claimed Common Swifts were actually small and rather poorly marked Map-winged Swifts (very common in the North East) and so to see Common Swifts in this abundance suggests that the species has finally made it north to Kincardineshire. I was excited, even if most readers would not be impressed.

Crab Island, Faversham, Kent, 4 July 2010

Leader: **John Badmin**. – This was a joint meeting between the Kent Field Club and the British Entomological and Natural History Society. American entomologist Seth Irish and Fera scientist Dom Collins arrived just about the same time having taken the train to Faversham and walked the mile or so through the town to the Creek. Allan Lawson and Laurence Clemons of the Kent Field Club completed the group.

We were looking forward to Norman Heal putting in an appearance but unfortunately he was unable to do so. The weather was remarkably bright and sunny and Faversham Creek looked a treat.

The morning was spent recording the fauna and flora along the western edge of the creek to its innermost point near Morrison's car park and then walking back along the footpath to Crab Island. This patch of land, about 50m north of the Albion pub was once a small island with its own houses and the site of a former shipyard. Today, it forms part of the western edge of the creek and the only evidence of its former existence is a small (20m) inlet covered over almost entirely from end to end with Sea club rush *Bolboschoenus maritimus*. Large numbers of the leafhopper *Paramesus obtusifrons* (Stål) were found among the tall rushes as well as the tenebrionid *Isomira murina* (L.). Dissection of the former showed the presence of an unknown pipunculid (about 10% of population sample) which it is hoped to identify using a DNA marker. Laurence Clemons recorded 48 species of Diptera along here including five RDBs – the chloropid *Melanochaeta pubescens* (Thalhammer), dolichopodid *Sciapus laetus* (Meigen), lauxanid *Homoneura notata* (Fallén), psilid *Chyliza vittata* Meigen and ulidiid *Melieria picta* (Meigen). Allan Lawson recorded 17 species of Coleoptera including the chrysomelids *Altica lythri* Aubé and *Phaedon tumidulus* (Germar) and the curculionids *Nedyus quadrimaculatus* (L.) and *Scolytus rugulosus* (Müller). Dom Collins recorded the thrips *Aeolothrips intermedius* Bagnall and *Melanthrips fuscus* (Sulzer) from grassy vegetation on the Island and *Haplothrips juncorum* Bagnall from the surrounding Sea club rush. The leader observed green-veined white *Pieris napi* (L.) laying eggs on Thanet weed *Lepidium draba*.

The afternoon was spent walking along the eastern side of the creek where we were joined by botanist Charles Turner from Cambridge. Large stands of Hog's fennel

Fig. 1 Frass volcanoes produced by larvae of *Gortyna borelli*, at nearby Whitstable, 2010. Photo: J. Badmin.

Peucedanum officinale proved to be of great interest to Dom, who soon, very calmly announced with a characteristically broad smile that he was almost completely certain he had refound *Dendrothrips saltator* Uzel, a species of thrips which had only ever been found once before in Britain, by R. S. Bagnall in 1931. This indeed proved to be the case after specimens had been examined microscopically (Collins, *Br. J. Ent. Nat. Hist* **23** (2010): 258) and made Dom's visit from York entirely worthwhile. Many of the plants showed evidence of the RDB oecophorid *Agonopterix putridella* (D. & S.) whose larvae live inside small bunches of leaflets spun together. The leader took time out to survey the base of Hog's fennel plants for the presence of Fisher's Estuarine moth *Gortyna borelli borelli* ssp. *lunata* Freyer, a noctuid introduced to Kent, but after inspecting 100+ clumps over a wide area none of the characteristic larval volcanoes (Fig. 1) were discovered. Hog's fennel proved to be quite rich in thrips with Dom also recording *Limothrips cerealium* Haliday (common thunder 'bug'), *A. intermedius*, *L. denticornis* Haliday, *Thrips angusticeps* Uzel, *T. tabaci* Lindeman and *T. vulgatissimus* Haliday.

Along the saltmarsh it was possible to find the odd patch of *Spartina anglica* and the new American planthopper *Prokelisia marginata* (Van Duzee) and sea wormwood *Seriphidium maritimum* with the RDB leafhopper *Chlorita viridula* (Fallén).

Seth Irish adopted a unique searching technique: crouching in any suitably tall vegetation to look for resting adult mosquitoes and we were convinced we had lost him several times during the day – in the creek on one occasion. His hard work was rewarded and among various Diptera he recorded were the mosquitoes, *Culiseta annulata* (Schrank) and *Culex pipiens*. L.

This proved a most rewarding day, despite us covering only a very small area of the upper reaches of Faversham Creek.

Browndown, Rowner, nr Gosport, Hampshire, 31st July 2010

Leader: Stephen Miles. – Compared to an earlier moth trapping field meeting run by the leader in May 2010, the portent for the evening was good. As we positioned our traps there was just a gentle south-westerly breeze and it was dry and warm with a small amount of cloud cover. A local visitor, a Mr I. Calderwood, accompanied us during the early part of the evening. Stewart Swift, who has had a long association with the site, along with his friend Pat Clipstone, and John Phillips decided to place their two mv traps in an area of mature trees further north, nearer to the main Alver Valley fen sites at SZ583998 and SZ583999 respectively; these were turned off at 23.00h and 00.45h. Tony Dobson chose to site his mv light right in amongst the fen vegetation that occurs parallel but somewhat north of the B3333, Privett Road at SZ584995, with his actinic light located just north in scrubland at SZ584996. Stephen Miles located his actinic light and sheet nearer to the site entrance amongst sallow, blackthorn and blackberry scrub, immediately south of the Browndown heathland at SZ580995. Thus all these traps were situated in Tetrad SZ5898. The leader's light was the last to be switched off at 01.30h and all participants reported what a pleasant and successful evening they had experienced.

Browndown North and the general area including the Browndown shingle beach, the Wild Grounds, Cherque and the Alver Valley have been well studied by lepidopterists. Its insect and other wild life was featured in a book authored by the late David Appleton, Michael Bryant and still current BENHS members, George Else and Dr Richard Dickson in 1976. As a consequence it has been interesting to compare the results of our trapping on this night with the earlier comprehensive species listing published in their book *The Insects and Plants of the Alver Estuary*.

Trapping on this night revealed 11 micro- and four macrolepidopterous species new to Browndown North: quite a remarkable feat in view of the 66 visits to this particular site between 1962 and 1976 and many subsequent visits by various recorders in the intervening years. These figures for new species were obtained by comparison with the book and additional information given in *Moths of Hampshire and the Isle of Wight* by B. Goater and T. Norriss published in 2001. A modern site list kindly supplied by Richard Dickson was also used in comparison. For the more significant records comparison has also been made with the distribution maps on the website of the Hampshire Branch of Butterfly Conservation at *www.hantsmoths.org.uk*.

One hundred and one moth species were recorded including four Nationally Notable species and one micro that has proposed RDB3 status. This latter species, *Yponomeuta rorrella* (Hübn.), attracted to Tony Dobson's actinic trap, was not only new to the site but also new to the SZ59 ten-kilometre square (see Butterfly Conservation's, Hampshire & Isle of Wight Butterfly & Moth Report 2010). The four species with Nb status were a single pyralid *Calamotropha paludella* (Hübn.), new to Browndown North, (though this species has been known from the adjacent shingle areas to the south since 1975). Cream-bordered Green Pea, *Earias clorana* (L.), two trapped and a single Webb's Wainscot, *Archanara sparganii* (Esper), all from Tony Dobson's mv trap. John Phillip's and Stewart Swift's combined results revealed one more Webb's Wainscot and also a specimen of the Mere Wainscot *Chortodes fluxa* (Hübn.), which as far as I understand may be the first specimen of this species recorded for the Browndown area since the late 1990s.

Other interesting species noted were 41 specimens of *Ectoedemia heringella* (Mariani), three of which were sent to Jon Clifton who kindly identified the moth from a genitalia dissection for Tony. The larval foodplant, Holm Oak is on the site, so it was indeed fortunate for Tony that his trap was near to this tree, as this species was new for him. The moth has been previously recorded in the Browndown area from tenanted mines (Hampshire and Isle of Wight Butterfly and Moth Report 2009) following its first discovery in Hampshire in 2007. We are led to believe that the Magpie moth *Abraxas grossulariata* (L.) has declined somewhat nationally; indeed in my home area I and the other main recorder in Bordon have yet to see it, and yet it occurred locally up to the 1970s. It was therefore nice to see one in John Phillip's trap, two on Stephen Miles' sheet and the leader also netted one in flight along one of the tracks. It is also good to report that glow-worm beetles continue to occur at Browndown North, as two were seen "glowing" on the southern fringes of the heathland grassland at the edge of the main east-west track.

It must be remembered that this area is not deep in the countryside, it is surrounded by a considerable amount of urbanisation, which has considerably increased since the original lists were made by the Fareham Entomologists in the 1960s and 70s. Alver Valley, of which Browndown North is a part, is in fact a narrow tongue of countryside projecting all the way down to Browndown beach but surrounded by Gosport to the east, Lee-on-the-Solent and Stubbington to the west and Fareham to the north. It is a tribute to the relatively benign management of the Ministry of Defence and Gosport Borough Council that so much good habitat still survives, although it remains a disaster that so much of the original Browndown Fen was lost to rubbish disposal in an earlier age.

Thanks are expressed to Malcolm Bartlett, representing Defence Estates for permission to hold this meeting.

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TINYTAGS FOR MONITORING TEMPERATURE AND HUMIDITY IN HONEYBEE (*APIS MELLIFERA*) HIVES UNDER FIELD CONDITIONS IN UK

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Abstract

Commercially-available Tinytags were used to monitor the temperature and humidity of air exiting a beehive in the author's garden, East Sussex from August 2009 to March 2010. Data indicated that the bees kept the temperature constantly up through the snowy periods of January and February 2010 whilst the humidity was high inside the hive. The use of Tinytags is explained for use in a beehive, but it also has applications for entomologists wishing to monitor insects at home, in the laboratory or in the field.

Introduction

Two Tinytags data loggers, purchased for ecological studies were evaluated in a small scale experiment to measure conditions inside the author's beehives. Tinytags data loggers are used for continuously monitoring temperature and humidity, usually in the food, pharmaceutical and agricultural industry (Gemini Data Loggers, 2010, Fig. 1). The blue-coloured Tinytag 'View 2' used in the present beehive study was a 6cm cube device attached to 7cm long probe via a 145cm extension (Fig. 2). The Tinytag is set up to record temperature (°C) and humidity (%RH) every 30 minutes. The tip of the probe has the sensory equipment within a 'honeycomb' of 14 little holes (3mm each) for protection (Fig. 2).

Methods

The blue Tinytag was laid on the metal gauze covering a hole in the crown board of the honeybee colony in the author's garden at Henley's Down, Battle, East Sussex. This monitored temperature and humidity emanating from the air passing through this gap in the crown board immediately above the honeybee cluster. Most of the warm and humid air emanating from the bees had to pass through this hole, so it was a good place for monitoring.

At the start, the probe was situated about 1cm from the top of the bees, but as the cluster began to tighten up and move to adjacent frames as winter progressed it was sometimes up to 17cm from the cluster, but still analysing all ventilated gases emanating from the whole colony. By way of a control a yellow-coloured Tinytag was secured to a nearby fence post at 2m above the ground and covered by a small shelter to stop incident rainfall and direct sunlight.

The Tinytag was kept in place on the same hive for five months: beginning August 2009 to the beginning of March 2010 and a standard laptop was used for downloading the data each month direct from the hive.

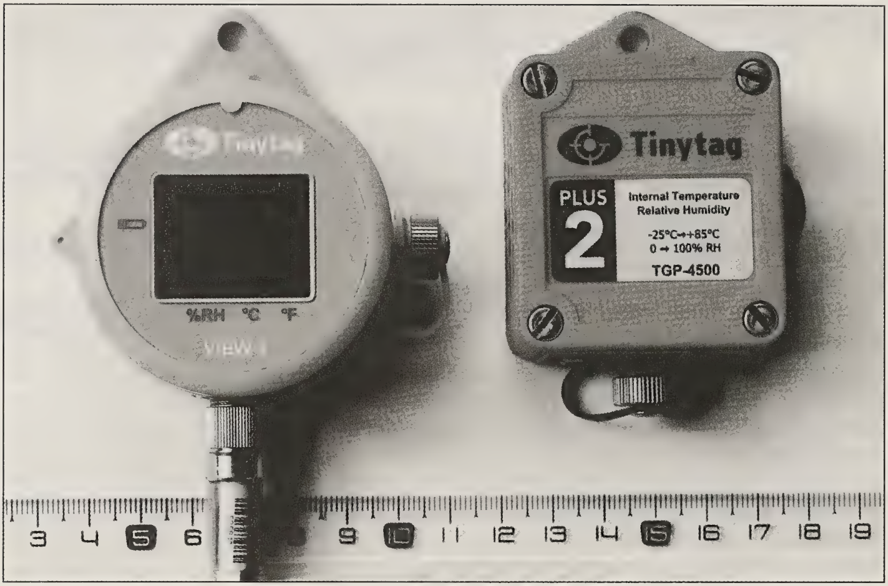

Fig. 1. Two data loggers, the View 2 (left, non-waterproof, for use in honeybee hive) and Tinytag Plus 2 (right, the waterproof one used outside). Photo: J. Feltwell.

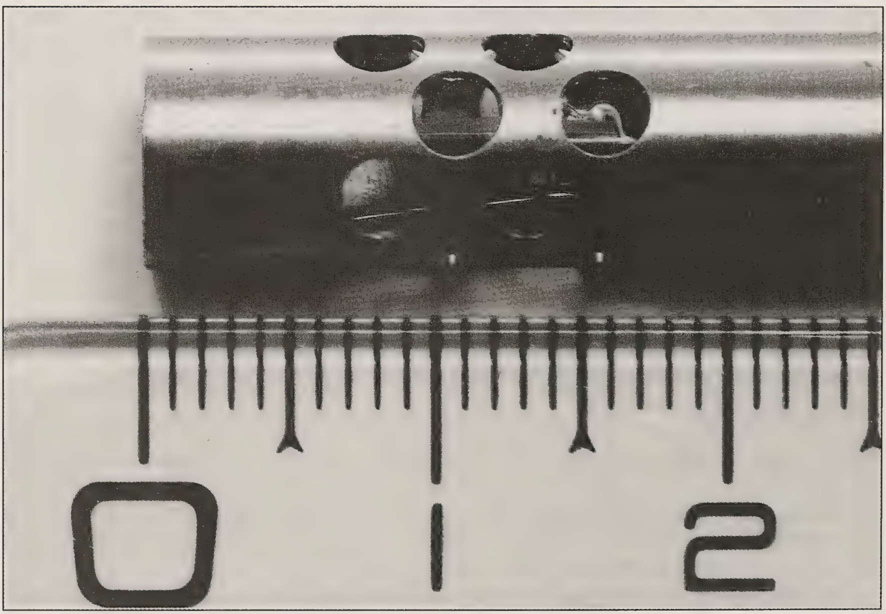

Fig. 2. The tip of the probe attached to the blue Tinytag (scale = cm). Photo: J. Feltwell.

RESULTS AND DISCUSSION

The data obtained from the Tinytag recorder positioned on the gauze covering the hole in the crown board of the bee hive are shown in Fig. 3.

When temperatures and relative humidity are compared over the five month period then it is clear that there was a dramatic change in the atmospheric conditions inside the honeybee hive at the beginning of November 2009. The graph shows a swap-over with a decreasing temperature and an increasing humidity. This dramatic change was maintained consistently for four months when the humidity decreased and the temperature increased. This was at a time when there was heavy snow on the ground in England during the early part of 2010.

During December 2009 there were five nights of frost in the apiary, twelve nights and days of snow in January and six days of frost or snow in February 2010, yet all the time the temperature of the expelled air from the honeybees never fell below 4°C.

What is clear is that as the winter progressed the temperature declined steadily inside the hive (as shown by the lighter line in Fig. 3 dropping to its lowest point, 4.0°C, on 7th January 2010). Thereafter the temperature started to increase again with various peaks of activity until the experiment was terminated on 1st March 2010.

In contrast, the humidity (darker line) increased steadily inside the hive until it peaked at c. 97.5%RH on about 7th January 2010 and then declined to its normal level of 55–70%RH.

The graph (Fig. 3) shows that the humidity for the period beginning 15th November 2009 through to 15th January 2010 was held at about 85–95%RH which is high and could be considered to be of concern for the health of the honeybees.

Recent work in Japan has indicated that relative humidity within a laboratory colony of *A. mellifera* was on average c. 80% over a three day period (Ohashi *et al*, 2009). The present research indicated a slightly higher relative humidity over a continuous four month period for gases coming from the winter colony inside

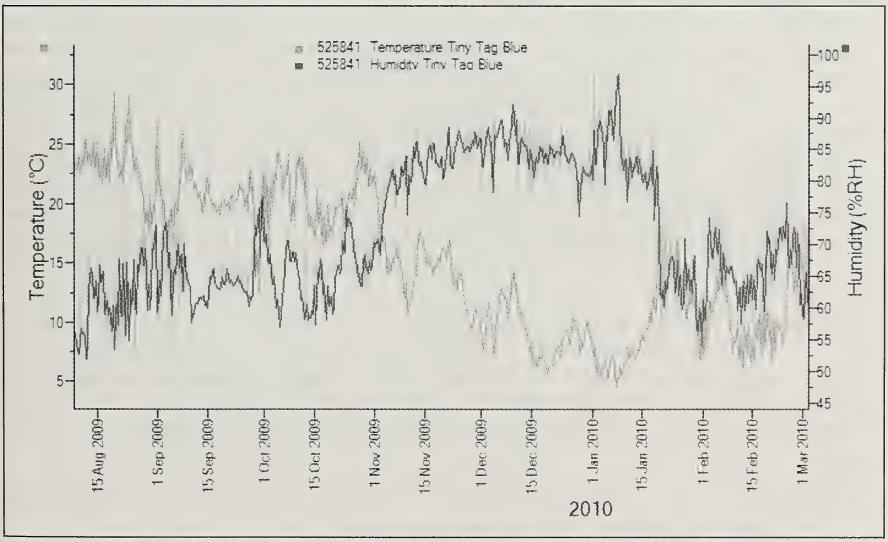

Fig. 3. Downloaded temperature and relative humidity data from inside a bee hive, Henley's Down, Battle, East Sussex, August 2009 to March 2010.

the beehive under field conditions. The humidity was higher within the honeybee colony probably due to the closed nature of the bee hive subject to outside weather conditions. It is interesting to reflect that Kraus & Velthuis (1997) stated that . . . *'most likely levels above 70% hardly occur in temperate and cold climates . . .'* However, in this case much higher humidities have been logged.

Comparison of the data in and outside the hive provided some interesting results. For instance in October 2009 the minimum temperature 'in the hive' was close to 30°C yet outside it went down to 3.6°C. In December 2009 the maximum temperature of air exiting the hive was 14°C whilst the outside air temperate was −2.7°C. This lower internal temperature may have been due to the cluster moving further away from the sensor.

The average temperature within a cluster of *A. mellifera* inside a beehive under laboratory conditions has been shown to be a constant 34.5°C with a range of 32–36°C according to Becher & Moritz (2009) who used an array of 256 small sensors situated within the bottom of the wax cells to record data.

The average temperature 'in the hive' as measured with Tinytags over a five month period, where the hive was situated outdoors was at least 10°C lower than in the laboratory. The rapid temperature drop observed can be mainly explained by the rapid drop-off of temperature from the centre of the cluster to the outside. Matthias Becher in his experiments in the laboratory found that temperatures lower at the periphery of the comb than at the centre of the comb, which one might expect (Becher & Moritz, 2009).

In these experiments with the Tinytag the probe was positioned about 1cm from the top of the outside of the cluster, and the cluster was probably half way down the frame, i.e. at about 17cm below the probe. So, over a distance of 17cm the temperature had dropped from the presumed colony average of 34.5°C to 3.6°C or by 30.9°C. Considering the outside temperature was −2°C the honeybees were still maintaining their temperature several degrees above the ambient temperature. Two factors are presumed constant, the bees own temperature control, i.e. at 34.5°C and the vented air from the colony via the hole in the crown board which will always be in tune with the daily health of the colony. As Kraus & Velthuis (1997) say that *'even in tropical climates the brood nest temperature does not exceed the temperature levels found in honey bee broods nests in colder climates*'. Bees are such good conservationists when it comes to energy conservation.

This appears to be the first time that Tinytags have been used for the measurement of conditions inside bee hives under field conditions. The results indicate that using this equipment the temperatures appear to be lower and relative humidities higher inside the beehive over the study period than in studies of beehives under laboratory conditions.

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MILITARY ACTIVITY AND AQUATIC INVERTEBRATE HABITATS IN UPLAND NORTHERN ENGLAND

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Abstract

Survey work at Spadeadam in northern England, originally a UK Government rocket testing area within a moorland and conifer plantation landscape and now used for training purposes, produced 157 site lists of macroinvertebrates. Military infrastructure, augmented by pond creation, increased the amount of available aquatic habitat. Classification identified eight habitat types, some of which were atypical of upland landscapes. The footprint left behind by past military infrastructure and activity increased habitat diversity with the presence of a considerable number of species not usually found in upland areas.

Introduction

Freshwater macroinvertebrate assemblages in upland areas of northern England are limited by the base-poor water (Eyre, Foster & Luff, 2005), with greater habitat diversity generally a product of man's need for water with the construction of reservoirs and lakes. There are few other developments in this landscape, with an exception being some military training areas. Military activity has had a detrimental effect on stream quality (Williams *et al.*, 2005) whilst road building, an integral part of training requirements, has also been shown to be deleterious to natural stream macroinvertebrate assemblages (Trombulak & Frissell, 2000). Some activities in upland Britain, especially quarrying, have led to an increase in habitat diversity (Eyre, Foster & Luff, 2005), although large-scale operations can reduce macroinvertebrate habitat quality (Bruns, 2005). Industry can be beneficial, especially by increasing wetland habitat on sites such as mills (Wood *et al.*, 2001) and by remnant pools and ponds left on brownfield sites (Eyre, Luff & Woodward, 2004).

A survey of aquatic macroinvertebrate sites at Spadeadam in Cumbria, a training area in upland northern England, was carried out in 2005. Military activity over the last 60 years has resulted in the construction of a number of developments on moorland, some of which, related to Blue Streak rocket development, have become derelict. In addition, there have been further changes related to the area's present use as a training area for military fighter aircraft, producing infrastructure changes within a relatively simple moorland landscape. These developments appear to have affected the distribution of freshwater habitats: the survey was designed to assess changes in habitat, species distribution and richness within the training area.

Methods

Study area and sites

Spadeadam is situated in central northern England (National grid reference 35/67) (Fig. 1) and was constructed and used as a United Kingdom government test site

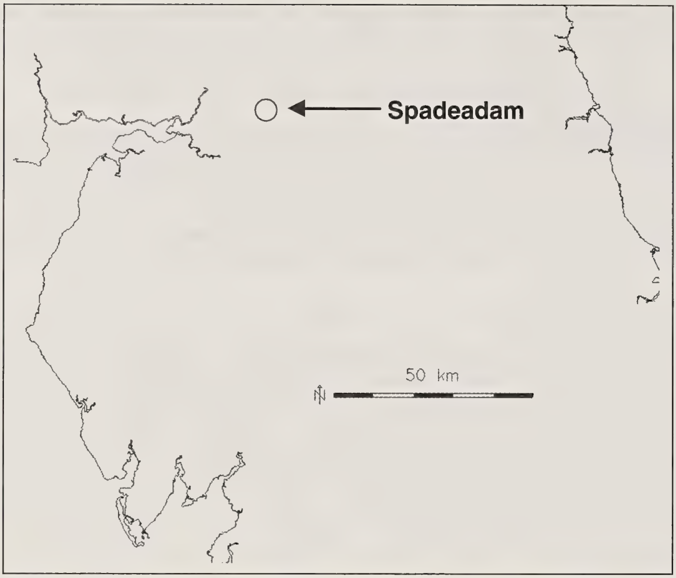

Fig. 1. Map showing the location of Spadeadam in northern England.

between the 1950s and the early 1970s for the Blue Streak rocket. Before development, the landscape was upland peat moor with a number of conifer plantations (220–320m above O.D.) and some other features such as old quarries. Whilst the plantations remained and expanded significantly in the 1950s as part of the afforestation of Kielder Forest District (McIntosh, 1995), areas of the moor were used for the building of a number of large concrete structures associated with test firing of Blue Streak rocket components. These included a number of large concrete water tanks, pools and drains for cooling purposes, as well as some wooden dams to reduce water flow in streams designed to limit the effects of fuel spills. There was also the construction of the necessary infrastructure for moving large military vehicles, mainly roads, culverts, hangars and parking facilities. Rocket testing finished in 1972 with the slow dereliction of some of the concrete facilities in the last 40 years. The area has since been used as a training facility by the Royal Air Force, with the provision of some new facilities, especially for radar surveillance and helicopter use. There was also the creation of a series of new ponds in 1993 for conservation and amenity purposes.

One hundred and fifty-seven sites were sampled for invertebrates in spring and summer 2005, with the permission of the military authorities, in an area with considerable conservation interest, especially for red squirrels. Twelve of these were ponds in old sandstone quarries whilst 39 sites were in ponds, pools and ditches dug out for conservation and amenity purposes. Twenty-six sites were situated in the derelict rocket testing areas and were a mixture of deep concrete troughs, small drainage channels and shallow concrete tanks, generally with considerable vegetation. Dammed streams provided 13 sites whilst another 24 were in ditches and ruts associated with heavy military vehicle use. Of the more 'natural' sites, 22 were on peat-based mires, a mixture of pools and drainage runnels, and 21 were

stream sites generally unaffected by military activity but varying in flow and vegetation cover.

Sampling, environmental variables and data analysis

Macroinvertebrates were sampled with a D-shaped net and sampling was carried out until it appeared no more new species were being caught. The total catch was stored in 70% industrial methylated spirit and sorted in the laboratory. All invertebrates were removed and adult Coleoptera and Heteroptera, larval Odonata, Ephemeroptera, Megaloptera, Plecoptera, Trichoptera, Mollusca and all Amphipoda were identified to species. Nomenclature of the Mollusca follows Anderson (2005) and the rest of the species follow Ball (1997).

Notes and measurements on four environmental variables were taken and generated. Vegetation cover was estimated to the nearest 10%, at the time of maximum site cover during the summer whilst pH of site water was measured using a hand-held pH meter (HI98127 HANNA instruments). The amount of flow at each site was assessed in three categories; (1) static, (2) very slow or intermittent flow, and (3) permanent streams. Water permanence was also assessed, using four categories: (1) temporary water bodies, usually ruts, that dry out in early summer, (2) longer-lasting temporary pools that dry out in mid to late summer, (3) ponds with permanent water but with considerable drawdown resulting in a residual pool in late summer, and (4) permanent water, either static or flowing, where the water level fluctuated little over the summer.

Classification of the invertebrate data was carried out using fuzzy set clustering (Bezdek, 1981) based on a presence/absence detrended correspondence analysis (DECORANA – Hill, 1979) ordination, as in Eyre *et al.* (2005). Scores on the first three axes of the ordination were used as the basis for the classification. The ordination was carried out using Version 4 of the CANOCO package (Ter Braak & Šmilauer, 1998), using the default settings and no data transformation. Information on the distribution and habitat preferences for water beetles were taken from Foster & Eyre (1992) and the National Water Beetle Distribution Scheme, for Hemiptera from Savage (1989) and for Mollusca from Kerney (1999).

Results

Eight habitat groups at the military training site at Spadeadam were identified from the fuzzy set classification. The frequency of occurrence of species in these groups is shown in Table 1, together with the number of species in each group and the number of species only found in each group.

Group 1 with 21 sites consisted of permanent ponds with pH values around neutral, generally created for amenity and conservation purposes. These ponds had deep water with dense fringing vegetation and there was a high incidence of the beetle species *Haliplus ruficollis* (Degeer), *Hydroporus erythrocephalus* (L.) and *H. palustris* (L.), together with the snail *Radix balthica* (L.) and the damselfly *Pyrrhosoma nymphula* (Sulzer).

The 20 sites in Group 2 consisted of a mixture of quarry and amenity ponds, with some ditches and ponds situated among concrete debris. These were permanent but shallower and more densely vegetated than sites in Group 1, with slightly more acidic water. Again there was a high incidence of *P. nymphula* but fewer *R. balthica* than in Group 1, with the beetle *Agabus sturmii* (Gyllenhal) characteristic and with the highest incidence of the dragonfly *Aeshna juncea* (L.).

Table 1. Frequency of occurrence (%) of macroinvertebrate at Spadeadam, Cumbria, based on the eight habitat groups (number of sites in each group in brackets) derived from the classification (at least 20% in one group).

	Group							
	1 (21)	2 (20)	3 (22)	4 (22)	5 (22)	6 (23)	7 (16)	8 (11)
Hydroporus umbrosus (Gyllenhal)* (Col)	24	18	5	–	–	–	–	–
Rhantus exsoletus (Forster)* (Col)	57	10	–	–	–	–	–	–
Haliplus ruficollis (Degeer)* (Col)	90	30	50	5	–	–	–	–
Agabus affinis (Paykull) (Col)	10	–	27	14	–	–	–	–
Hydroporus erythrocephalus (L.)* (Col)	81	70	64	9	–	9	–	–
Hydroporus tristis (Paykull) (Col)	10	20	36	36	36	–	–	–
Hydraena riparia Kugellan* (Col)	29	2	45	9	5	9	–	–
Sigara venusta (Douglas & Scott)* (Hem)	38	5	5	–	–	9	–	–
Hydroporus palustris (L.) (Col)	81	65	68	18	5	35	–	–
Laccobius bipunctatus (Fabr.)* (Col)	76	20	45	14	–	13	25	–
Hydroporus gyllenhalii Schiödte (Col)	24	50	64	59	32	13	13	–
Notonecta glauca L.* (Hem)	38	20	5	–	9	17	–	–
Nemoura cambrica Stephens (Ple)	48	15	50	32	5	9	38	–
Hydroporus nigrita (Fabr.)* (Col)	–	5	41	36	18	4	6	–
Ilybius ater (Degeer)* (Col)	–	30	–	5	9	4	–	–
Hydroporus obscurus Sturm (Col)	–	10	–	5	23	9	–	–
Hydrobius fuscipes (L.) (Col)	71	80	100	77	36	39	56	9
Gerris thoracicus Schummel* (Hem)	–	15	5	18	50	–	–	–
Aeshna juncea (L.) (Odo)	–	55	–	–	23	35	–	–
Helophorus grandis Illiger* (Col)	–	10	23	9	9	4	–	–
Hesperocorixa castanea (Thomson)* (Hem)	–	50	–	–	5	36	–	–
Pyrrhosoma nymphula (Sulzer) (Odo)	62	65	18	23	32	65	–	–
Limnephilus stigma Curtis (Tri)	33	–	27	–	–	–	–	–
Agabus sturmii (Gyllenhal) (Col)	33	90	45	23	59	43	6	–
Galba truncatula (Müller) (Mol)	5	–	41	9	–	4	13	–
Hydroporus pubescens (Gyllenhal) (Col)	10	15	27	23	64	4	6	–
Hydroporus incognitus Sharp (Col)	48	75	73	82	45	43	13	18
Hesperocorixa sahlbergi (Fieber)* (Hem)	33	25	14	27	5	44	13	–
Lymnaea palustris (Müller)* (Mol)	38	5	27	9	5	26	19	–
Callicorixa praeusta (Fieber)* (Hem)	24	–	5	–	9	4	–	9
Limnebius truncatellus Thunberg (Col)	10	10	32	32	18	22	–	–
Agabus bipustulatus (L.) (Col)	24	65	59	82	77	43	38	27
Limnephilus lunatus Curtis (Tri)	29	15	18	–	–	52	13	–
Phryganea bipunctata Retzius (Tri)	–	15	–	–	9	22	–	–
Sigara nigrolineata (Fieber) (Hem)	29	20	14	14	23	39	–	–
Limnephilus auricula Curtis (Tri)	–	5	–	–	–	–	31	–
Hydroporus memnonius Nicolai (Col)	10	5	50	41	18	4	38	18
Hydroporus discretus (Fairmaire) (Col)	5	–	9	14	–	–	31	–
Anacaena globulus (Paykull) (Col)	33	55	59	86	48	43	81	27
Helophorus flavipes (Fabr.) (Col)	5	5	27	55	59	18	6	18
Oxyloma elegans (Risso) (Mol)	–	5	23	9	5	22	25	9
Radix balthica (L.) (Mol)	76	25	59	14	5	74	50	45
Helophorus aequalis Thomson (Col)	–	15	14	27	41	13	6	18
Gyrinus substriatus Stephens (Col)	–	15	–	9	14	26	–	9
Haliplus lineatocollis (Marsham) (Col)	–	10	27	55	18	30	6	36
Ilybius fuliginosus (Fabr.) (Col)	–	30	5	–	14	30	–	36

(*continued*)

Table 1. (*continued*)

	Group 1 (21)	2 (20)	3 (22)	4 (22)	5 (22)	6 (23)	7 (16)	8 (11)
Gerris lacustris (L.)* (Hem)	–	15	5	5	–	39	6	9
Agabus guttatus (Paykull) (Col)	–	–	–	9	9	–	25	–
Hesperocorixa linnaei (Fieber)* (Hem)	–	–	–	–	36	–	–	18
Agabus paludosus (Fabr.) (Col)	–	–	5	–	–	–	38	9
Helophorus brevipalpis Bedel (Col)	–	5	–	18	32	9	–	36
Plectrocnemia conspersa (Curtis) (Tri)	–	–	–	5	5	–	88	18
Velia caprai Tamanini (Hem)	–	–	–	23	18	9	56	55
Sialis lutaria (L.) (Meg)	10	10	5	–	5	65	19	91
Gammarus pulex (L.) (Amp)	–	10	–	5	14	39	56	82
Sialis fuliginosa Pictet (Meg)	–	–	–	5	–	–	–	45
Anabolia nervosa (Curtis) (Tri)	–	–	–	–	–	26	–	64
Habrophlebia fusca (Curtis) (Eph)	–	–	–	5	–	–	6	27
Enochrus affinis (Thunberg) (Col)	–	5	–	9	36	–	–	–
Potamophylax rotundipennis (Brauer) (Tri)	–	–	–	–	5	4	–	100
Platambus maculatus (L.) (Col)	–	–	–	–	–	9	–	91
Ephemera danica (Müller) (Eph)	–	–	–	–	–	–	6	55
Oreodytes sanmarkii (Sahlberg) (Col)	–	–	–	–	–	–	–	45
Sericostoma personatum (Spence) (Tri)	–	–	–	–	–	–	–	55
Hydraena gracilis Germar (Col)	–	–	–	–	–	–	–	27
Total number of species	52	59	50	51	56	70	41	43
Number of species only in each group	11	2	–	3	4	8	3	9

Species order according to the first ordination axis. Abbreviations in brackets denote invertebrate groups (Amp, Amphipoda; Col, Coleoptera; Eph, Ephemeroptera; Hem, Hemiptera; Meg, Megaloptera; Mol, Mollusca; Ple, Plecoptera; Odo, Odonata; Tri, Trichoptera) and * indicates species with lowland distributions in northern England.

Group 3 consisted of a mixture of 22 shallow ponds, ditches and pools on the old rocket testing areas. These were well vegetated with fluctuating water levels, but never drying out, with pH values around neutral. The beetle species *Hydrobius fuscipes* (L.) and *Hydroporus gyllenhalii* Schiödte were characteristic, and the effects of water level fluctuation were reflected in the highest incidence of the snail *Galba truncatula* (Müller) and fewer *P. nymphula*.

Ditches, ruts and drainage runnels by roads, together with some pools in concrete, made up the 22 sites in Group 4. These sites had pH values between 5 and 6.5, had varying amounts of vegetation and were prone to drying out. The presence of the beetles *Hydroporus incognitus* Sharp and *Agabus bipustulatus* (L.) were indicative of temporary water.

The 22 sites in Group 5 were mainly peat-based pools and ditches, with a few stream sites on peat, with pH values between 4.3 and 5.8. These were not densely vegetated and most had fluctuating water levels. *Hydroporus pubescens* (Gyllenhal) and *A. bipustulatus* were characteristic and this group had the highest incidence of the acid water beetle species *Helophorus flavipes* (Fabr.) and *Enochrus affinis* (Thunberg).

Group 6 with 23 sites was dominated by ditches and streams that were either concrete or had been dammed for military purposes. All had fluctuating water flow and variable water permanence together with limited vegetation and with pH values

between 6 and 8. *Pyrrhosoma nymphula* and *R. balthica* were characteristic, together with the alderfly *Sialis lutaria* (L.), in an assemblage not dominated by beetle species.

Slow flowing streams and ditches made up most of the 16 sites in Group 7. There were a number associated with the old rocket site drainage systems, some were by roads and some were small streams. All had permanent water, considerable vegetation and basic pH, with a high incidence of the caddis *Plectrocnemia conspersa* (Curtis) and *Anacaena globulus* (Paykull) and the most *Agabus paludosus* (Fabr.).

The 11 sites in Group 8 were streams with relatively fast flowing water, limited vegetation and pH values between 7 and 8 and were unaffected by the military. The caddisfly *Potamophylax rotundipennis* (Brauer), the amphipod *Gammarus pulex* (L.) and the beetle *Platambus maculatus* (L.) were characteristic.

The number of species recorded from each Group (Table 1) indicated that the slow-flowing or dammed stream sites in Group 6, generally adapted for or a product of military use, supported the most species (70), whilst the pond, pool and ditch sites in Groups 1 to 5 had species totals of between 50 and 59. The two relatively unaffected stream Groups, 7 and 8, had the fewest species. There was a total of 130 species recorded in the survey, of which 11 were found only in Group 1. These were relatively newly dug pond sites and other sites in Groups 4 and 6 affected by the military which had three and eight species limited to these groups. The species with mainly lowland distributions highlighted in Table 1 indicated that a considerable number of the species recorded on the Spadeadam training area were not characteristic of moorland areas.

Discussion

The use of a classification technique such as fuzzy set clustering enables the identification of habitats based on invertebrate assemblages, providing a far more objective identification of habitat types than any imposed by subjective surveyor interpretation. Aquatic invertebrate habitat diversity in upland northern England, dominated by moors and conifer plantations, is generally limited by the base-poor nature of the landscape. Habitats on peat-based moors generally fall into either static or slow-flowing water on mires, dominated by acid-water beetle species (Eyre, Ball & Foster, 1986), although a more diverse assemblage is present where the acid water is buffered in streams with sandstone beds (Eyre *et al*., 2005), as at Spadeadam. A number of habitats not normally associated with upland northern England, especially basic pond, temporary and slow-flowing water, were identified within the Spadeadam military area, a result of a combination of previous and present use augmented by the provision of new water bodies to increase conservation and amenity value. There were considerably more water beetle species found at Spadeadam compared with the number recorded from other upland sites in northern England (Foster & Eyre, 1992). Some of the habitats identified from the classification were dominated by sites in derelict military infrastructure, some were influenced by the need to use large military vehicles and others were the product of habitat creation. It was apparent that the major changes brought about by military activity on aquatic invertebrate habitats were mainly related to the provision of more static water bodies with neutral and basic water and the concomitant differences in vegetation structure. Exposure of acidic water to the underlying sandstone bedrock buffered water in a number of ponds whilst the slow disintegration of concrete structures also resulted in water with higher pH values. Habitat diversity was also increased with the provision of temporary water bodies, with base-rich water. The number of species unique to habitat groups dominated by sites present as a result of

military activity and conservation measures also indicated the positive aspects of the changes made in the landscape.

Whilst there are reports that building and road construction have a detrimental effect on stream habitats (Trombulak & Frissell, 2000), there are cases such as stormwater ponds created beside roads providing species-rich invertebrate habitat (Scher & Thiery, 2005). Urbanisation is likely to result in a less diverse water beetle fauna (Lundkvist, Landin & Karlson, 2002) but the derelict rocket testing areas on Spadeadam appear to have increased both the number of habitats and the number of species present. Other military activities, such as tank testing, have been shown to provide good crustacean habitat in temporary ruts (Maier, Hossler & Tessenow, 1998), whilst Prezant and Chapman (2004) found that there was no diminution of suitable molluscan habitats on a military training range compared with the surrounding countryside. Temporary ponds and pools, of the kind found on Spadeadam, have been shown to have considerable invertebrate conservation potential (Nicolet *et al.*, 2004) and such ponds add significantly to overall regional biodiversity (Williams *et al.*, 2004). Beebee (1987) identified the importance of concrete debris in diversifying wetland habitats on a military site in southern England, with greater species richness and abundance of amphibians and macroinvertebrates occurring in base-rich water compared to that in acid rainfed bog pools. The combined effects of habitat disturbance caused by military activity and the creation of officially agreed conservation sites by the authorities at Spadeadam range has resulted in significant increase in freshwater invertebrate species and habitat diversity in this part of northern England, with a mosaic of habitats considerably richer than those in the surrounding landscape.

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SHORT COMMUNICATION

***Rhinocyllus conicus* (Frölich) (Col.: Curculionidae) in Surrey and South Essex.** – On 27 June 2011, I found adults of this species on welted thistle *Carduus crispus* at the edge of a sandy arable field off Suffield Lane, Puttenham (SU925470). Although present as a sub-fossil from Neolithic deposits at Runnymede (Robinson, 1991. The Neolithic and late Bronze Age insect assemblages. In Needham, S. (ed.), *Excavation and Salvage at Runnymede Bridge, 1978: the Late Bronze Age Waterfront Site*, 277–326. British Museum Press, London), this appears to be the first historic record for this weevil in Surrey. Further evidence of this weevil's continued spread was also gathered at Hadleigh Castle LNR, South Essex (TQ8086) on 27 May 2010, and at (TQ7986) on 15 May 2011, where adults were frequent on thistles growing in pasture land.– JONTY DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

CRYPTURAPHIS GRASSII (STERNORRHYNCHA: APHIDIDAE): FIRST RECORDS FOR CORNWALL

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ABSTRACT

A species of aphid, *Crypturaphis grassi* Silvestri, native to southern Italy and Corsica and first recorded in the UK in 1998, has been recorded in Cornwall for the first time. It is distributed throughout VC1, where significant numbers of individuals have been found feeding on Italian alder *Alnus cordata*. A species description is given together with details of its known distribution in the UK. A survey is currently underway to ascertain the full extent of the species' distribution in West and East Cornwall (VC1 and VC2, respectively).

INTRODUCTION

A significant number of specimens of the aphid *Crypturaphis grassi* Silvestri have been found in West Cornwall (VC1). The first colony was discovered during a 24-hour BioBlitz event at Duchy College, Rosewarne, Camborne, in June 2011, when viviparous and immature apterae were found on leaves of a single Italian alder *Alnus cordata* (Loisel.) Desf. located within the college grounds. Identification of the aphid species was confirmed by Chris Malumphy, Senior Entomologist and Collections Manager at The Food and Environment Agency (Fera), from photographs, species observations, and host plant information.

Although specimens of *C. grassii* have been recorded elsewhere in the UK (references herein), this is the first occasion on which it has been recorded in Cornwall (ERCCIS, 2011).

SURVEY

As part of a 24-hour BioBlitz event at Duchy College, Rosewarne, Camborne (SW 642412), which took place 17–18 June, 2011, leaves of a single Italian alder *Alnus cordata* were routinely checked for invertebrates. Tiny individuals (up to 3mm in length) resembling scale insects (Coccoidea) were found on nearly every leaf checked. Specimens were subsequently removed for further investigation and identification. Having failed to identify the specimens using resources available, photographs were sent to Chris Malumphy (Fera), whereupon a correct identification of the aphid *C. grassii* was gratefully received.

Italian alder, introduced to Britain in 1820, principally as an ornamental park/garden species, is a fast growing, hardy and wind-tolerant tree (Mitchell, 1978; Mitchell & Wilkinson, 2001), which is particularly suited to Cornwall's maritime climate (Rosewarne Experimental Horticultural Station, 1984; Meneer, 2007; pers. obs.). During the 1980s, it was commonly planted as a roadside, waterside and/or windbreak species (Rosewarne Experimental Horticultural Station, 1984; Meneer, 2007) and now occurs throughout the county, although distribution records are more numerous for West Cornwall (VC1) than for East Cornwall (VC2) (BSBI, 2011; ERICA, 2010).

Believing the species more likely to be under-recorded in Cornwall rather than a new and/or isolated occurrence, a survey was initiated to assess the extent of the aphid's distribution in the county.

During July 2011, eight additional trees in West Cornwall (VC1) were surveyed for *C. grassii*. Seven mature trees were located in the author's village of Paul (SW 461271) and the eighth on the outskirts of Penzance (SW 484313). Fifty leaves per tree were removed, taking care to gather a variety of leaf sizes from all around the tree. The leaves were then examined in turn using a Leica Zoom 2000 microscope, and the number of individuals (immature apterae, apterae, alatae) noted.

Data obtained during July of this year are positive for all trees thus far surveyed, with a total of 300 individuals (144 immature apterae, 156 apterae) observed on 400 leaves ($n = 8$, 50 leaves per tree checked, mean no. of individuals per tree 37.5). With the exception of two winged females which emerged whilst in captivity, all specimens observed in July were apterae or immature apterae (Plate 13, Figs 1–3).

In September 2011, six of the original eight trees were re-surveyed at the principal site in Paul. Apterae (including immature apterae) were still present but in significantly fewer numbers (total observed 42, mean per tree 7.0). Two winged females were also recorded on the leaves (Plate 13, Fig. 4).

In November 2011, a small number of oviparous apterae were found, again at the principal site, and a single winged male also collected (Plate 13, Fig. 5). Egg batches were observed on leaves of all trees checked and also amongst leaf litter. It remains to be seen if these belong to *C. grassii*, and several batches are being monitored in captivity accordingly.

In October and November of this year, passing checks revealed apterae on further specimens of *A. cordata* at Duchy College, Rosewarne, at the Combined Universities in Cornwall (CUC) campus at Tremough, Penryn (SW 774349), and in the Alverton area of Penzance (SW 466297), respectively.

The survey will re-commence early in 2012.

Species description and biology

Taxonomically located in the subfamily Calaphidinae, *C. grassii* is the only species in its genus. It is considered autoecious and monophagous, feeding only on *A. cordata* (Blackman & Eastop, 1994, 2011), a Mediterranean tree species, with a relatively small native range, consisting of several small areas of the southern Apennines in Italy and the wet, mountainous area of northeastern Corsica (Blackman & Eastop, 1994, 2011; Ducci & Tani, 2009). Although not yet properly evaluated, the host trees have thus far shown no obvious signs of damage from feeding by *C. grassii* (pers. obs.).

Crypturaphis grassii is considered a holocyclic species (Dixon & Thieme, 2007; Blackman & Eastop, 2011), and the discovery of oviparous females, a winged male and (presumed) egg clutches indicates that this is indeed the case; however, it is considered that in some situations, anholocyclic overwintering could also occur (Blackman & Eastop, 2011).

Whilst the emergence time after overwintering of the aphid is still to be established, *A. cordata* is a deciduous species with a long leafing season – normally from early spring to late autumn (Mitchell, 1978; pers. obs.). Throughout its active season, apterae can be found feeding along the veins of *A. cordata* leaves. Both sides of the leaf are utilised, with more-mature individuals seeming to favour the upper-side of leaves, particularly at the top of the petiole at the base of the midrib (pers. obs.).

Viviparous and oviparous apterae are approximately 2–3mm in length, are dorso-ventrally flattened, with short antennae, and have plate-like frontal and lateral projections (Dixon & Thieme, 2007; Blackman & Eastop, 2011; pers. obs.). Viviparous individuals are yellowish-green to yellowish-brown, with brown spots extending along the dorsal surface, around the edge of the abdomen and on the head.

Compound eyes are reddish in colour. The presence of cornicles is not explicit. Immature apterae are similar but smaller, paler and lacking in dark spots, more translucent and slightly more elongate in shape. Oviparous apterae are similar in size and shape to viviparous apterae but are brown in colour, with transverse darker abdominal stripes, rather than spots. In oviparous apterae, wax-producing glands are evident on either side of the cauda.

Both male and female alatae have an approximate body length of 2–3mm, have dark heads with a pair of tubercular frontal processes between the antennae (plus what is described as 'a balloon-like projection on each side of the prothorax' (Dixon & Thieme, 2007)), a light brown/yellowish thorax and abdomen (the latter with a brown patch of varying degree), with black/brown thoracic lobes (Dixon & Thieme, 2007; Blackman & Eastop, 2011; pers. obs.). Legs are dark, as is the upper edge of the wings. Compound eyes are reddish in colour.

Photographs of immature, viviparous and oviparous apterae, and both male and female alatae of C. *grassii* are provided (Plate 13).

A small number of individuals collected between July and September have shown signs of parasitism by a fungal pathogen (Fig. 1).

UK Distribution

Crypturaphis grassii was first recorded in the UK as recently as 1998 when it was recorded quite widely across southern England, from East Kent (VC15), South Essex (VC18) to North Somerset (VC6) (Harrington, 1998) (Fig. 2). Known records now exist for 19 vice-counties including West Cornwall (VC1) (Fig. 2, Table 1); however, with the exception of VC41 (Glamorganshire), VC56 (Nottingham) and in VC1, where established colonies have been observed (Baker, 2009 & 2011, pers. comm., Nov; J Clough 2011, pers. comm., Oct/Nov), numbers recorded have been low (max.

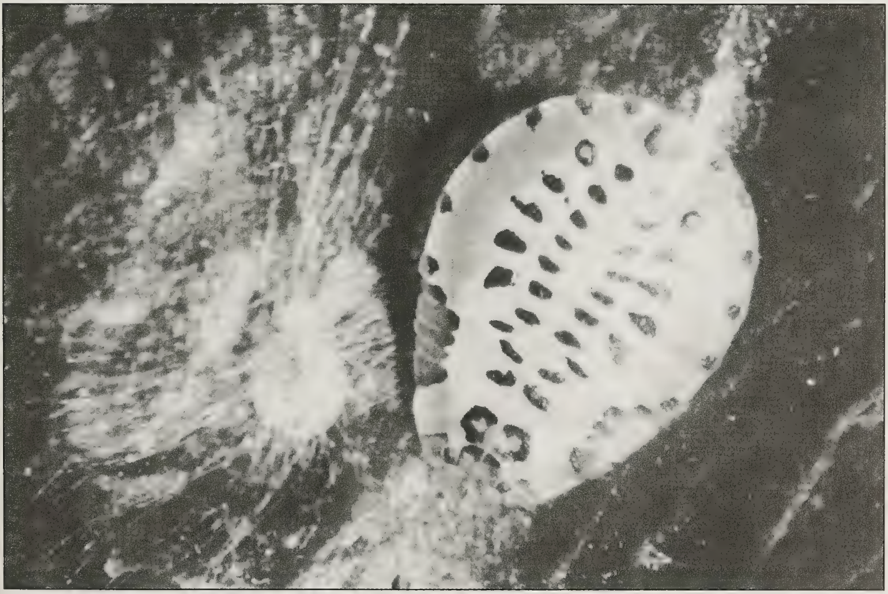

Fig. 1: *Crypturaphis grassii* aptera (right) feeding next to an individual affected by a fungal pathogen. It appears that the affected individual is enclosed in waxy filaments.

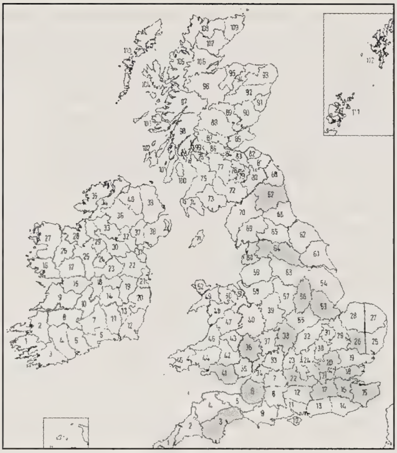

Fig. 2: Map showing vice-counties in which *Crypturaphis grassii* is known to have been recorded (grey). Original map source: British Bryological Society (2011).

Table 1. Summary of records of *Crypturaphis grassii* from UK.

Source	Vice-county	Years
M. Taylor, 2011 (pers. comm. Jul/Oct) – Rothamsted Suction Trap Data	3 South Devon	2002, 2007, 2008
	15 East Kent	2000–7; 2010–11
	18 South Essex	2000; 2002; 2004; 2006–7; 2009–10
	20 Hertfordshire	2000; 2007–8; 2010
	22 Berkshire	2000; 2002; 2004; 2007–8
	26 West Suffolk	2002; 2006–7; 2009–10
	36 Herefordshire	2007; 2010
	38 Warwickshire	2005–8; 2011
	53 South Lincolnshire	2002; 2005; 2007–11
	60 West Lancashire	2000; 2002–3; 2005–11
	64 Mid-west Yorkshire	2003–4; 2006–11
	67 South Northumberland	2002–3; 2006–7; 2011
Harrington, 1998	6 North Somerset	1998
	15 East Kent	1998
	18 South Essex	1998
S. Reid, 2011 (pers. comm. Aug) – Fera information	15 East Kent	2005
	16 West Kent	2005
	17 Surrey	2003
	21 Middlesex	2003
E. Baker, 2009, 2011	41 Glamorganshire	2005–8
J. Clough, 2011	56 Nottinghamshire	2011
S. Luker	1 West Cornwall	2011

10 individuals per year per location). The most northerly records based on suction trap samples are from Mid-west Yorkshire (VC64) and South Northumberland (VC67) in 2002–2004.

Further work

The establishment of *C. grassii* on Italian alder and its potential spread to related *Alnus* species and interaction with native aphid species and their pathogens is the subject of the author's PhD research at the Centre for Ecology & Conservation, University of Exeter, Cornwall Campus. As such, details of new records, distribution information, interesting observations and samples of this species would always be gratefully received.

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SHORT COMMUNICATIONS

A first record of Yellow-ringed Carpet *Entephria flavicinctata* (Hübn.) (Lep.: Geometridae) on Mull, Argyll, Scotland. – On 29 April 2011 three individuals of *Entephria flavicinctata* ssp. *flavicinctata* were attracted to actinic light at Lochbuie, Mull, Argyll, Scotland, NM6224. In the Mid Ebudes (VC103), there are records of this species from the islands of Iona and Coll, but a previous record of *E. flavicinctata* for Mull has been re-determined as *Nebula salicata* ssp. *latentaria* (Curtis) Striped Twin-spot Carpet (Alan Skeates, pers. comm.). One of the specimens at Lochbuie did not enter the trap and this was photographed in situ on a rock face. This photograph was looked at by Alan Skeates (VC103 recorder and Butterfly Conservation volunteer) and the identity of the moth was confirmed by Tom Prescott of Butterfly Conservation. The trap was located amongst rocky outcrops immediately adjacent to the sea loch. English stonecrop *Sedum anglicum* was found growing on some of the rocks and this may be the food plant for the larvae of *E. flavicinctata*.

The moth trap used was on loan from Butterfly Conservation, as part of a scheme for Mull residents and visitors like ourselves, to learn more about moths and to improve the knowledge of the distribution of moths on Mull.

We are grateful to Alan Skeates for arranging the loan of the traps during our two week visit and to Butterfly Conservation and Scottish Natural Heritage for financing their purchase. – M. T. and S. A. Jennings, 206 Lower Higham Road, Gravesend, Kent, DA12 2NN

Notes on the ecology of *Valenzuela atricornis* (McLachlan) (Psoc.: Caeciliusidae) in England. – New (2005) suggests that *V. atricornis* is a rare, perhaps local psocid, found on low vegetation. A more recent assessment of the species status is given by Alexander (2009) who states that in his experience this species is most frequently encountered in tall wet fen vegetation dominated by reeds or rushes. This certainly appears to be the case, as in 2011, I found it to be present in virtually every reed bed I examined across six southern counties. Summary of records: North Hampshire (VC12) – Bourley Hill (SU8250), on reed in former reservoir, 29.viii.2011. Surrey (VC17) – Frensham Little Pond (SU8641), numerous in extensive reed beds, 15.vii.2011, Bolder Mere (TQ0758), 20.viii.2011. The Rye (TQ166585), reed choked balancing ponds, 18.viii.2011. South Essex (VC18) – South Benfleet (TQ7885), on reed growing both in a brackish ditch, and on banks amongst terrestrial grasses, 29.viii.2011. Middlesex (VC21) – Shortwood Pond, Staines (TQ048719), abundant amongst extensive reed beds, 20.viii.2011. Berkshire (VC23) – Barrow Farm Fen (SU4697), two on reed in partial shade, Marcham Park (SU4496) numerous on *Carex* bed growing in open at margins of small pond, both 20.ix.2011. East Norfolk (VC27) – Wymondham (TG1200), amongst reeds at margins of carp lake, 14.vii.2011. – Jonty Denton, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

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FLETCHER SCALE *PARTHENOLECANIUM FLETCHERI* (HEMIPTERA: COCCIDAE), A NORTH AMERICAN PEST OF CYPRESS AND YEW, NEW TO BRITAIN

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ABSTRACT

Parthenolecanium fletcheri (Cockerell), a North American pest of cypress (*Thuja*) and yew (*Taxus*), was first recorded in Europe in the 1930s and has since spread widely in continental Europe. In June 2011 a mature western red cedar (*Thuja plicata*) tree in Pimlico, London, was found to be infested with *P. fletcheri*. This is the first time that this scale insect has been found breeding in Britain. The host range, biology, geographical distribution and economic importance of *P. fletcheri* are reviewed.

INTRODUCTION

A sample of foliage was collected from a mature western red cedar (*Thuja plicata* Donn ex D. Don) (Cupressaceae) growing in a private garden in Pimlico, London, by Mary Jones on 24 June 2011, and submitted to The Food and Environment Research Agency (Fera) for analysis. The foliage was found to be infested with hundreds of live first-instar nymphs and two dead, post-reproductive adult female Fletcher scales, *Parthenolecanium fletcheri* (Cockerell) (Hemiptera: Coccidae), a North American pest of cypress (*Thuja*) and yew (*Taxus*). This is the first time that *P. fletcheri* has been recorded breeding in Britain. A larger sample collected from the same tree on 5 July, contained 17 dead, post reproductive adult females and more than a thousand live first-instar nymphs. Three of the adult scales contained hymenopterous parasitoid emergence holes. The infested tree was approximately 20–25 years old, 5–7 m high, imported from Italy, and planted as a mature specimen in 2004. *Parthenolecanium fletcheri* is therefore likely to have been breeding outdoors in London for seven years, and to have survived the exceptionally cold winters of 2009/10 and 2010/11. A Fera Plant Pest Fact Sheet on *P. fletcheri* has been published to alert the U.K. horticultural industry (Malumphy, Eyre & Cannon, 2011). Also present on the *Thuja plicata* were several adults, eggs and first-instar nymphs of the juniper scale, *Carulaspis juniperi* (Bouché) (Hemiptera: Diaspididae), a Mediterranean species that has naturalised widely in southern England on Cupressaceae since the 1950s (Boratynski, 1957).

There are inconsistencies in the literature regarding the status of *P. fletcheri* in Britain. It is not recorded from Britain in the most recent checklist of British Coccidae (Boratynski & Williams, 1964), or in recent published and online World Catalogues of Coccidae (Ben-Dov, 1993, 2011), or the catalogue of the European fauna (Danzig & Watson, 2011). It was, however, recorded from Great Britain in a Palaearctic catalogue by Kozár (1998), although no further details were provided. The latter record was almost certainly based on a single slide deposited at the Natural History Museum (NHM), London, labelled *Parthenolecanium fletcheri*?, with the following collection details: Wisley, *Thuja occidentalis fastigiata*, 15.i.1953 (Ref. No 895; BM 81-539). The handwriting belongs to K. L. Boratynski and it was almost certainly collected from the Royal Horticultural Society's Garden (RHS),

Wisley, Surrey. There are, however, only three second-instar nymphs mounted on the slide, which cannot be confirmed as *P. fletcheri*, because the taxonomy is based on adult females. Boratynski did not recognise the sample as *P. fletcheri* and excluded the species from his subsequent checklist of British scale insects (Boratynski & Williams, 1964).

The author contacted entomologists at RHS Wisley, Royal Botanic Gardens (RBG), Kew, Surrey and The Eden Project, Cornwall in June 2011 and requested that their collections of Cupressaceae be inspected for *P. fletcheri*. No examples of *P. fletcheri* were found.

The purpose of this communication is to report the presence of *P. fletcheri* in Britain and to review its host range, biology, geographical distribution and economic importance. Slide-mounted specimens of *P. fletcheri* have been deposited at the Natural History Museum and The Food and Environmental Research Agency. It is commonly known as arborvitae soft scale, Fletcher scale or Thuja scale.

Parthenolecanium fletcheri (Cockerell)

Synonymy: *Lecanium fletcheri* Cockerell, 1893; *Lecanium arion* Lindinger, 1912.

Detection and identification

Post-reproductive females (Plate 14, Figs 1 & 2) are oval, somewhat extended at both extremities, strongly convex, almost hemispherical, yellowish-brown to dark reddish brown; up to 3.5 mm long and 3.0 mm wide. Mature adult females are frequently found in Europe with hymenopterous parasitoid emergence holes (Plate 14, Fig. 3). Teneral adult females (Plate 14, Fig. 4) are reddish purple-brown with a distinct cream or yellow mid-dorsal longitudinal stripe and occasionally a marginal yellow band; this stripe is not observed in any other *Parthenolecanium* species present in the UK. The first-instar nymphs are a pinkish-orange colour (Plate 14, Figs 5–6) and the eggs are white.

There are four morphologically similar species of *Parthenolecanium* present in Britain. *Parthenolecanium corni* (Bouché) is locally common throughout Britain, broadly polyphagous on woody plants, particularly Rosaceae, and an occasional pest of many ornamentals and fruit crops. *Parthenolecanium persicae* (Fabr.) is widespread in southern England but rarely recorded, and is broadly polyphagous but most frequently recorded on grape vine (*Vitis vinifera* L.) in Britain. *Parthenolecanium pomeranicum* (Kawecki) is locally common throughout most of England and Wales, and feeds on English yew (*Taxus baccata* L.) (Malumphy, Halstead & Salisbury, 2011). *Parthenolecanium rufulum* (Cockerell) occurs widely in southern and central England; it is oligophagous on woody plants, but appears to be largely restricted to oak (*Quercus* spp.) in Britain.

Kosztarab & Kozár (1988) provided descriptions of adult females and a key to the identification of *Parthenolecanium* species found in Europe (see comments below). Further morphological descriptions and illustrations of adult female *P. fletcheri* were published by Hamon & Williams (1984), Gill (1988) and Kosztarab (1996). *Parthenolecanium fletcheri* is morphologically closest to *P. pomeranicum* (Kawecki, 1954).

The identification of *Parthenolecanium* to species in Europe is obscured by inadequate taxonomy. This is largely due to the adult females, the stage most frequently encountered, becoming heavily sclerotised with maturity, making it almost impossible to see many of the diagnostic features. The morphological

characters used in published diagnostic keys are often limited to those that remain visible in mature specimens. These characters are more variable than the literature indicates, making the keys unreliable. For example, one of the key diagnostic characters for the identification of *P. persicae* is the presence of 24–42 dorsal submarginal tubercles, yet the author has found as few as 15 on specimens recently collected from grape vine in Malton, North Yorkshire; *Parthenoleucanium rufulum* is usually distinguished morphologically from *P. corni* by the shape of the marginal setae, yet there appears to be wide variation in setal shape. Unfortunately, teneral females usually occur for only a few weeks during the spring and are often not available for study. The group requires a thorough revision, including molecular analysis, and recent work has suggested that in some instances early-instar nymphs may prove to be more easily identified than mature adult females (Rainato & Pellizzari, 2009).

Host plants and biology

Parthenolecanium fletcheri is oligophagous on Cupressaceae and is most frequently recorded on *Thuja*. In North America it is also common on *Taxus* sp..

Cupressaceae: *Cupressus* sp.; eastern red-cedar *Juniperus virginiana* L.; *Juniperus* sp.; Chinese arborvitae *Platycladus orientalis* (L.) Franco; eastern arborvitae *Thuja occidentalis* L, including cultivars such as 'Aureospicata'; *Thuja* sp.; eastern hemlock *Tsuga canadensis* (L.) Carrière; *Tsuga* sp. **Taxaceae**: *Taxus* sp. (Kosztarab & Kozár, 1988; Ben-Dov, 1993, 2011; Kosztarab, 1996).

Parthenolecanium fletcheri feeds on the foliage, upper and lower surfaces, shoots and bark. It is parthenogenetic, lays up to 1,346 eggs per female, has one generation each year in most of its range, and overwinters as the second (rarely third) instar (Dziedzicka, 1968; Kosztarab & Kozár, 1988; Kosztarab, 1996). A partial second generation is reported from Central Europe (Dziedzicka, 1968) and a complete second generation in Central Asia (Dzhadaibaev & Parshina, 1974). In Central Europe adults lay eggs in May, which hatch from the end of June to mid-July, and moult during August and September (Kosztarab & Kozár, 1988). In Central Asia, first instars of the first generation appear at the beginning of May, and those of the second generation at the beginning of September (Dzhadaibaev & Parshina, 1974).

Natural enemies include the following: COLEOPTERA **Anthribidae** *Anthribus nebulosus* Forster. HYMENOPTERA **Aphelinidae**: *Coccophagus fletcheri* Howard; *Coccophagus lycimnia* (Walker). **Encyrtidae**: *Blastothrix hedqvisti* Sugonyaev, *B. longipennis* Howard; *Blastothrix sericea* Dalman; *Blastothrix* sp.; *Cheiloneurus albicornis* Howard; *Encyrtus aurantii* (Geoffroy); *Metablastothrix claripennis* Compere; *Metaphycus insidiosus* (Mercet); *Metaphycus pulvinariae* Howard; *Metaphycus* sp.; *Microterys nietneri* (Motschulsky); *Microterys sylvius* (Dalman). NEUROPTERA **Chrysopidae**: *Chrysopa aspersa* Wesmael. FUNGI **Clavicipitaceae**: *Lecanicillium lecanii* R. Zare & W. Gams (Kosztarab & Kozár, 1988; Kosztarab, 1996; Universal Chalcidoidea Database, http://www.nhm.ac.uk/research-curation/research/projects/chalcidoids/).

The following natural enemies are present in the UK: *A. nebulosus*, *B. longipennis*, *B. sericea, C. lycimnia, L. lecanii, M. insidiosus* and *M. sylvius*.

Geographical distribution

Parthenolecanium fletcheri is native to North America and occurs throughout most temperate areas of the USA and parts of Canada. It was accidentally introduced to Europe, being first recorded in Poland in the 1930s (Kawecki, 1935). It occurs widely

in Europe from Bulgaria, and Serbia and Montenegro in the south; to Latvia, North West Russia and Sweden, in the north; France in the west and Kazakhstan in the east.

Nearctic: Canada, USA. **Palaearctic**: Armenia; Austria; Bulgaria; Czech Republic; France; Georgia; Germany; Hungary; Kazakhstan; Latvia; Lithuania; Netherlands; Poland; Romania; Russia; Serbia and Montenegro; Sweden; Switzerland; UK (single incursion reported here); Ukraine; Uzbekistan (Danzig & Watson, 2011; Gertsson, 2005; Gill, 1988; Kosztarab, 1996; Kosztarab & Kozár, 1988). *Parthenolecanium fletcheri* has not yet been recorded from Italy although the infested tree in London was imported from Italy and it is present in neighbouring countries.

Economic importance

Parthenolecanium fletcheri is a damaging pest of *Taxus* and *Thuja* in the USA (Kosztarab, 1996). Infested plants lose vigour, leaves turn yellow, wilt and drop, and sooty moulds develop on the eliminated honeydew (Westcott, 1973). It has occasionally been reported to damage ornamental *Thuja* in urban areas in the Czech Republic (Prihoda, 1986), Kazakhstan (Dzhadaibaev & Parshina, 1974), Poland (Golan, 2003) and the Caucasus region (Yanin, 1975). Large populations were found on young *Thuja* plants grown under protection at a commercial nursery in Lithuania (Malumphy, Ostrauskas & Pye, 2008). However, it is rarely recorded in Western Europe and does not appear to be an economically important pest there.

Conclusions

Fletcher scale has the potential to naturalise widely in Britain, wherever its host plants occur, as it has been breeding outdoors in London for seven years and is present in Canada and Scandinavia. The winters of 2009/10 and 2010/11 were the coldest in southern England for decades but the scale survived outdoors. The importation of Cupressaceae from European Union member states is unregulated and whole ecosystems may be transplanted with large mature trees from the Mediterranean and Central Europe to Britain. This provides a clear pathway for the continual introduction of non-native plant pests of Cupressaceae. Examples of non-native scale insects that have been introduced into Britain with Cupressaceae, Pinaceae and Taxaceae include the armoured scales (Diaspididae) *Carulaspis juniperi* and *C. minima* (Signoret) (Boratynski, 1957), *Forinia externa* (Ferris) (Williams, 1988; Halstead, 1992); the soft scale (Coccidae) *P. pomeranicum* (Malumphy, Halstead & Salisbury, 2011); and the mealybug (Pseudococcidae) *Planococcus vovae* Nasonov (Williams, 1984; Halstead, 1992).

Fletcher scale is unlikely to have any significant impact on natural biodiversity, ecosystems, crops or forestry in Britain, as it is not an economic pest in Western Europe and there is already a complex of natural enemies present in Britain that is likely to keep the scale in check. Parasitism (16% of adult females) has already been observed in the samples of *P. fletcheri* collected in London.

Acknowledgements

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SHORT COMMUNICATIONS

***Elaphropus parvulus* (Dejean) (Col.: Carabidae) in North Hampshire and East Norfolk.** – On 21.viii.2004, I took three adult *E. parvulus* (apparently new for VC12), running around close to cracks on the patio of my then home at Kingsmead, Medstead, north Hampshire (SU6437), and saw adults which I assume were this species on many subsequent occasions into 2005. More recently on 25.viii.2011, I saw at least two adults active in bright sunshine in very similar (albeit weedier) circumstances, on my patio in Four Marks (SU6734), the cracks were well vegetated with procumbent pearlwort *Sagina procumbens*, self-heal *Prunella vulgaris*, seedling purple toadflax *Linaria purpurea,* and silver-moss *Bryum argenteum*. Some long-overdue impromptu weeding disturbed several more *E. parvulus*.

At Wymondham, East Norfolk (TG1200), on 14.vii.2011 I took two adults of *E. parvulus* on bare gravel on draw down margins of a large fishing pond. It is clear that this species no longer deserves RDB3 (rare) status, and is probably a very abundant if somewhat under-recorded carabid. – JONTY S. DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

***Megacoelum beckeri* (Fieber) (Hem.: Miridae) associated with Cypress trees.** – On 28 July 2011, I beat dozens of adults and associated nymphs of *M. beckeri,* from both Monterey Cypress *Cupressus macrocarpa* including var. 'Goldcrest', and Lawson's Cypress *Chameaecyparis lawsoniana*, all with abundant cones, growing in Kingston Cemetery (TQ1868) in Surrey. On 7 August I took a single male on Lawson's Cypress, again with abundant cones, growing in Farnham Cemetery (SU8346). Although the taxonomic status of *M. beckeri* remains a matter for debate, my previous encounters with this 'species' (based on separation using hind leg hair characters), were from Scots pine *Pinus sylvestris* trees near wood ant *Formica rufa* nests on Surrey heathland. In Kingston Cemetery most Cypress trees sampled, yielded abundant adults and nymphs of another species which has adapted to living on this host namely *Eremocoris fenestratus* (Herrich-Schäffer) (Lygaeidae). – JONTY S. DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

***Colletes hederae* Schmidt & Westrich (Hym.: Apidae) in Oxfordshire.** – Adults of this species were very abundant on ivy growing along hedgerows in the Frilford Heath area of modern Oxfordshire (VC22) (SU4598 & SU4697) on 27 September 2011. Given the sheer abundance of adults across a wide area, it seems likely that the bee had been established in the area for at least a year. Previous records from VC22 have been made in the Reading area (Stuart Roberts *pers. comm.*), but these appear to be the first for modern Oxfordshire. – JONTY S. DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

FIRST INCURSIONS OF *ALOEA AUSTRALIS* (HEMIPTERA: MIRIDAE) AND *PULVINARIA DELOTTOI* (HEMIPTERA: COCCIDAE) IN EUROPE, AND THREE OTHER HEMIPTERAN INSECTS IMPORTED FROM SOUTH AFRICA

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ABSTRACT

In July 2011 succulent plants in the quarantine glasshouse at the Royal Horticultural Society's (RHS) Garden Wisley, Woking, Surrey were found to be infested with five non-native hemipteran pests: the aloe aphid *Aloephagus myersi* Essig, the white aloe scale *Duplachionaspis exalbida* (Cockerell), a mealybug *Vryburgia* sp., the small mirid bug *Aloea australis* Schuh and the iceplant scale *Pulvinaria delottoi* Gill. This is the first incursion of the latter two insects into Europe.

INTRODUCTION

In July 2011 several pot-grown aloes of undetermined species (*Aloe* spp., Asphodelaceae) and a *Cheiridopsis glomerata* Hammer (Aizoaceae) growing in the quarantine glasshouse at the Royal Horticultural Society's (RHS) Garden Wisley, Woking, Surrey (TQ0659) were found to be infested with five hemipteran pest species. Specimens of the pests were identified at The Food and Environment Research Agency (Fera). All of the infested plants had originally been imported from South Africa and exhibited at the RHS Chelsea Flower Show, London, on the Kirstenbosch National Botanical Garden stand, 24–28 May 2011. As with all imported plants at the Chelsea Flower Show, they were inspected by the Plant Health and Seeds Inspectorate prior to the show opening. The plants were donated to the Royal Horticultural Society at the end of the show. On arrival at RHS Garden Wisley the plants were placed in the propagation department's quarantine glasshouse. No pests were found on the plants at an initial inspection by RHS entomologists (6 June 2011), shortly after arrival at Wisley Garden. However, by 6 July, it was clear that the plants were infested with several sap-sucking insects.

THE INSECTS

Aloea australis Schuh (Hemiptera: Miridae), commonly known as the small mirid bug in South Africa (Annecke & Moran, 1982), was found to be heavily infesting some of the *Aloe* plants. The foliage of the infested plants was covered with hundreds of tiny 1–2mm diameter droplets of liquid excrement that had dried to form black specks (Plate 15, Fig. 1). Infested plants also exhibited severe chlorotic spotting, which in some areas had coalesced to form pale patches. This is the first report of this mirid in Europe and it appears to be the first known breeding population outside South Africa (Mike Wilson, National Museum of Wales, pers. comm.). *Aloea australis* was described from specimens collected from *Aloe* sp. in Pretoria, Transvaal, South Africa (Schuh, 1974). The adults are 2.6mm long, the head and pro-thorax are dark reddish brown, and the wings have a yellowish base, a distinct orange red band across the fore-wing (cuneus), and a membranous tip (Plate 15,

Fig. 2). It has been recorded as a pest of *Aloe* in South Africa (Annecke & Moran, 1982). Dried specimens of *A. australis* have been deposited in the Fera and RHS insect reference collections.

One other non-native species of *Aloea* has been recorded in Britain: *A. nigritula* Linnavuori; two adults were found in England on an *Aloe* imported from Tanzania in 1990 (determined by Gary Stonedahl, formerly of the International Institute of Entomology, London, Ref. IIE A21345).

Aloephagus myersi Essig (Hemiptera: Aphididae), commonly known as the aloe aphid, was found to be heavily infesting one of the *Aloe* plants. This aphid has been found previously in the UK at The Eden Project, north Cornwall (SX0554), in 2002, and at the Royal Botanic Gardens (RGB) Kew, Surrey (TQ1776), in October 2010, on plants imported for a display at the British Museum, London, from Kirstenbosch Botanical Garden, South Africa (Fera unpublished data). The aloe aphid is widespread in sub-Saharan Africa, where it is possibly native (Blackman & Eastop, 2006). It has been reported as established in glasshouses in Europe and outdoors in Spain and Italy (Biase, 1988; Hermoso de Mendoza *et al.*, 2002; Blackman & Eastop, 2006). Outside Europe it is reported as present in Queensland, Australia (CSIRO, 2004), Japan (Sano & Matsumota, 2005), and California, from where the species was originally described, and Florida, USA (Halbert, 2004; Blackman & Eastop, 2006). The apterous stage of the aphid is densely dusted with wax, giving it a woolly appearance (Plate 15, Fig. 3), and 1.8–2.5mm long. It is easily confused with a mealybug (Pseudococcidae). Hosts are listed as *Aloe* species; in Africa it probably has *Pistacia* sp. (Anacardiaceae) as a second host in the sexual phase (Blackman & Eastop, 2006).

Pulvinaria delottoi Gill (Hemiptera: Coccidae), known as an iceplant scale, was found on *Cheiridopsis glomerata*. One adult female with an ovisac and five bright green first-instar nymphs were present. This is the first UK and European report of this scale (Ben-Dov, 2011). It was previously only known from South Africa and California (Ben-Dov, 1993). In California it is a pest that feeds on *Carpobrotus* species (Aizoaceae), used to stabilise roadside embankments (Washburn, & Frankie, 1985), other hosts include: *Carpobrotus edulis* (L.), *Cheiridopsis inaequalis* L., *Lampranthus* sp., *Mesembryanthemum* sp. in the Aizoaceae and *Crassula muscosa* L. and *Sedum* sp. in the Crassulaceae (Ben-Dov, 1993). Adult females are circular to oval; moderately convex and 2–5mm long, young adults are bright green (Plate 15, Fig. 4) but change significantly with maturity and oviposition. At first they develop a reddish margin and a thin dorsal covering of white powdery wax before becoming a uniform reddish-brown with transverse wrinkles. They produce an irregular white ovisac beneath the body. *Cheiridopsis glomerata* is a new host record for this scale. Specimens have been deposited in the Fera insect reference collection. *Pulvinaria delottoi* can easily be confused in life with *Pulvinariella* (= *Pulvinaria*) *mesembryanthemi* (Vallot), a species also known as iceplant scale that has become naturalised on Aizoaceae in Cornwall, including the Isles of Scilly (Williams, 1985). The two species may be distinguished using the descriptions and keys provided by Gill (1988).

Duplachionaspis exalbida (Cockerell) (Hemiptera: Diaspididae), commonly known as the white aloe scale, was found to be heavily infesting *Aloe* species. This species occurs widely in southern Africa and feeds exclusively on *Aloe* (Malumphy, in press). This is the fourth time that it has been found in the UK; first recorded from England in 1926 from London; a large population was found at The Eden Project in 2002; and thirdly, aloes imported to RBG Kew for an exhibition at the British Museum, in 2010 (Malumphy, in press).

Specimens of a mealybug *Vryburgia* sp. (Hemiptera: Pseudococcidae) were also found on the *Aloe* plants, but they were all damaged by hymenopteran parasitoids and it was not possible to determine the species.

All the above pest infestations took about six weeks before the insects and damage became conspicuous. It is likely that all the pests encountered on the plants would only survive under glasshouse conditions in the UK and so no statutory action was required by Fera. However, to eliminate the risk to RHS plant collections all infested plants were destroyed by bagging and burning in August 2011.

Discussion

This case highlights the risk of introducing non-native insects into plant collections with plants donated from botanical shows when the plants originally came from abroad. It is also obvious that such pests may not be evident on imported plants for months after importation into the UK. It is therefore clear that imported plants should ideally be kept in quarantine for several months before they are introduced into plant collections in order to reduce the risk of non-native pests becoming established.

Acknowledgements

Thanks are due to Mike Wilson for information on *Aloea australis*, Cara Smith for bringing the infestations to the attention of RHS entomologists, and James Armitage for checking the plant nomenclature.

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SHORT COMMUNICATION

***Harpella forficella* (Scopoli) (Lep.: Oecophoridae) new to the UK.** – On the night of Friday 19 August 2011, NJP ran a 125W Skinner trap in his garden in Barkham, Wokingham, in east Berkshire (SU784676, VC22). The night was clear and cool but dry, and the following morning there was a moderate catch for the site of 93 moths of 35 species. While unpacking the trap, NJP's son Adam (14) pointed out an unfamiliar ginger and white micro-moth about 10mm long (see Plate 15, Fig. 5). The moth was tubed for later examination.

Closer inspection revealed a pair of long upwardly curved palps and a head-up posture. The moth had a gingery brown ground colour with a broad, irregular curved cream line running from the base of the forewing to the tornus, and a further pale patch close to the apex. Suspecting it might be an oecophorid, NJP checked the standard identification books and websites, without success. A photo of the moth was posted on the Berkshire Moth Group yahoo site appealing to more experienced members of the group for assistance. Both Roy Dobson and Mark Calway independently suggested *Harpella forficella* (Scopoli) as a possible identification, and a brief search online yielded images that matched the moth. This identification was subsequently confirmed from the photo by David Agassiz and John Langmaid. There are no known previous records of this species in the UK (J. R. Langmaid pers. comm.). The moth has been allocated the species code 652a, being between *Alabonia* and *Tachystola* in Bradley's Checklist of Lepidoptera recorded from the British Isles (2000).

The trap site is a suburban garden near the edge of a housing estate, with oak/birch/rowan woodland and open countryside nearby. None of the other species taken that night was an obvious migrant. It is possible that an earlier stage such as a larva or pupa could have been imported into Berkshire with woody material from the continent, although this is speculative.

Harpella forficella is widely distributed on the continent, especially in western and southern areas, becoming scarcer to the north and east. Its larvae are found in the dead wood of deciduous trees, often underneath loose bark, and the moth is said to spend two years in the larval stage. Adults fly in the afternoon and early evening, and again at dawn, but are also attracted to light occasionally (Palm, E. 1989, *Nordeuropas Prydvnger*, Fauna Boger, Copenhagen). Additional photos of the adult and early stages can be seen at *http://www.lepiforum.de/cgi-bin/lepiwiki.pl?Harpella_Forficella*

Thanks to Adam Percival for spotting the moth, to Roy Dobson and Mark Calway for the initial identification and to David Agassiz and John Langmaid for confirming this, following correspondence with MCH. – NICK J. PERCIVAL, 24 Almond Close, Barkham, Wokingham, RG41 4UU (email: *nick@perci.u-net.com*) and MARTIN C. HARVEY, Evermore, Bridge Street, Great Kimble, Aylesbury, HP17 9TN (email: *kitenetter@googlemail.com*).

PROCIPHILUS FRAXINIFOLII (HEMIPTERA: APHIDIDAE), A SPECIES NEW TO BRITAIN

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ABSTRACT

The aphid *Prociphilus* (*Meliarhizophagus*) *fraxinifolii* (Riley) is reported for the first time in Britain. Details of the host plant, feeding habit and location of the record are provided and comment is made on the economic potential of the aphid.

INTRODUCTION

The phenomenon of new aphid introductions to Britain is well-known, and such new records in the 30 years up to 1999 were summarised by Martin (2000). Since 1999, five invasive, tree dwelling aphid species have been discovered established in the wild in Britain, comprising *Cinara brauni* Börner on *Pinus nigra* (Baker, 2009); *Hoplocallis picta* (Ferrari) on *Quercus ilex* (Baker, 2009); *Illinoia liriodendri* (Monell) on *Liriodendron tulipfera*; *Myzocallis walshii* (Monell) on *Quercus rubra* (Baker, 2009) and *Tinocallis takachihoensis* Higuchi on *Ulmus glabra* (Döring, 2007) and *Ulmus procera* (Döring, 2008). The present paper reports the discovery of another species, *Prociphilus fraxinifolii* (Riley) found in Ross–on-Wye, Herefordshire, on a red ash, *Fraxinus pennsylvanica*.

Prociphilus (*Meliarhizophagus*) *fraxinifolii* (Riley) (Eriosomatinae: Pemphigini)

On July 17 2011 the first author collected waxy, winged and wingless aphids from a 'leaf nest' on an exotic ash tree growing on Broad Street, Ross-on-Wye, Herefordshire. Jerry Ross, a local arboriculturist, was able to supply further specimens in July, confirm the identity of the tree as an early mature *Fraxinus pennsylvanica*, and estimate the number of leaf nests as six, of varying sizes and situated predominantly on the lower lateral branches growing on the north side of the tree (see Plate 15, Fig. 6). Several apical buds and bud clusters were also observed to be harbouring aphids.

The presence of winged and wingless aphids in busy leaf nests so late in the year on *F. pennsylvanica* aroused suspicion that the species was the North American *P. fraxinifolii*, since the *Fraxinus* inhabiting *Prociphilus* species previously recorded from Britain produce only winged progeny and migrate to the roots of their secondary host, *Abies* spp., in early summer. Examination of gross morphology under a stereomicroscope fitted its description in Blackman & Eastop (1994), as updated at *http://www.aphidsonworldsplants.info/AWT%20front%20pag1.htm*. The identification was confirmed following detailed examination of slide preparations by the second author.

Almost all aphids feeding on *Fraxinus* species belong to the pemphigine genus *Prociphilus*, broadly characterised by having six antennal segments, segment VI with a very short processus terminalis, and with ovoid glandular wax-secreting patches

particularly visible on posterior abdominal segments; alatae have forewing vein M unbranched and flagellar segments have transversely elongate sensoria. Specimens of *P. fraxinifolii* are somewhat smaller than other species, the body length given as less than 3mm by Blackman & Eastop (1994), and alatae have irregularly-shaped sensoria on the base of segment VI that differ from those on segment III.

Discussion

Prior to the discovery of *P. fraxinifolii*, the only *Prociphilus* Koch species known from *Fraxinus* in Britain were *P. bumeliae* (Schrank) and *P. fraxini* (Fabr.). Unlike *P. fraxinifolii*, both of these species are host-alternating, forming leaf nests in spring and early summer on *Fraxinus*, particularly *F. excelsior*, but also potentially *F. pennsylvanica* and, in the case of *P. bumeliae*, other members of the Oleaceae. Winged aphids then migrate to *Abies* roots before another generation of alatae return to *Fraxinus* in autumn where production of sexuales, mating and egg laying take place. Unlike *P. fraxinifolii*, *P. bumeliae* and *P. fraxini* produce only winged progeny on *Fraxinus*. Winged specimens of *P. fraxinifolii* may be separated from *P. bumeliae* and *P. fraxini* by the presence of characteristic secondary rhinaria on the base of antennal segment VI (see above).

Host plants of *P. fraxinifolii* were listed as 'American *Fraxinus* spp.' by Blackman & Eastop (1994), with distribution given as North America from Canada to Mexico, and introduced into Chile and South Africa. Subsequently *P. fraxinifolii* has been reported from Hungary (Remaudière & Ripka, 2003) and Serbia (Petrović-Obradović *et al.*, 2007). Trenchev and Trencheva (in press) report the discovery of this aphid in 2007 on *F. pennsylvanica* in Bulgaria. In Serbia, the aphid has spread since 2006 to colonise American *Fraxinus* species planted across Belgrade, with the aphids possibly arriving on air currents or on nursery stock from Hungary (Olivera Petrović-Obradović, pers. comm.). Clearly, this aphid is highly mobile.

Mitchell (1974) described *F. pennsylvanica* as 'Rare; in collections and a few gardens'. The only other American *Fraxinus* species that may serve as a host for *P. fraxinifolii* that features in Mitchell's book is *F. americana*, described as 'Rare; in collections, a few gardens and London parks'. The Royal Horticultural Society Plant Finder (2010) lists six nurseries stocking *F. pennsylvanica* or its cultivars and thirteen nurseries stocking *F. americana* or its cultivars. Barcham Trees Plc, a Cambridgeshire-based containerised tree supplier, recently (2011) issued an update to their catalogue that included a cultivar of *F. americana* and advertises it as an alternative to the commonly planted, but structurally unreliable *Fraxinus angustifolia* 'Raywood'. Thus it is possible that American *Fraxinus* species may become more common as amenity trees in Britain in the future.

The *F. pennsylvanica* in Ross-on-Wye was sourced originally from the Herefordshire-based tree nursery, Wyevale Hawkins (Andrew Middlecote, pers. comm.), but according to a representative of this nursery (Kevin Jarvis, pers. comm.), the ultimate source of the tree is likely to have been the Netherlands. Given the present rarity of American *Fraxinus* species in Britain, it is probable that *P. fraxinifolii* arrived on nursery stock as eggs or live aphids. No British suction trap records for this aphid species are known (Mark Taylor, Rothamsted Research, pers. comm.), but this does not preclude the possibility that it is now established on American *Fraxinus* species in the few British nurseries that stock such trees in significant numbers.

Since *P. fraxinifolii* is not known to colonise *F. excelsior*, its pest potential in Britain is considered relatively insignificant. As such, Forest Research is not

proposing sanitation measures (Sharon Reid, Food & Environment Research Agency, pers. comm.). Nevertheless, vigilance is required since European and Asiatic *Fraxinus* species will not have been available to this aphid in large numbers until its arrival in Europe, possibly a decade ago. It now remains to be seen whether it will adapt to colonise Old World *Fraxinus* species, a situation which would change the economic status of this aphid considerably.

Acknowledgements

Thanks go to Jerry Ross for supplying additional aphid specimens, identifying the host tree and providing original photographs. Geof Tarring (Herefordshire County Council), Andrew Middlecote (Amey) and Kevin Jarvis kindly liaised to establish the source of the tree in Ross-on-Wye and Sharon Reid (Food and Environment Research Agency) contacted Forest Research to make them aware of the record and to ascertain if any sanitation measures were proposed. Mark Taylor (Rothamsted Research) provided information on suction trap records and helpful information on the status of *P. fraxinifolii* in Serbia was provided by Olivera Petrović-Obradović (Faculty of Agriculture, University of Belgrade).

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Trenchev, G. & Trencheva, K., (*in press*). *Prociphilus fraxinifolii* Riley (Hemiptera, Aphididae, Eriosomatinae) a species new to the Bulgarian fauna. *Collection of scientific paper of Institute of Forestry*.

SHORT COMMUNICATIONS

New vice-county records of *Clitostethus arcuatus* (Rossi) (Col.: Coccinellidae) and a new association with wild cabbage. – The ladybird *Clitostethus arcuatus* (Rossi) is a specialist whitefly predator easily identified due to the pale horseshoe-shaped marking on the light- to dark-brown elytra (Plate 16, Fig. 1). It is native throughout the western Palaeartic particularly around the Mediterranean but not in Scandinavia or the Baltic (Booth & Polaszek, 1996). In northern Europe, it was historically encountered only on walls, cliffs or in woodlands in thermally optimal areas, usually being recorded from beating of ivy, though its geographical and host plant range in Germany appear to have expanded in the last half century (Pütz *et al*, 2000). Records from the UK are limited in number but extend as far north as Yorkshire (Roy *et al*, 2011). The species has been categorised as RDB 1 – Endangered in the UK due to its very limited occurrence (Hyman & Parsons, 1992). In 2010, during the course of a survey of the distribution and ecology of the wild cabbage *Brassica oleracea* (L.) and the whitefly *Aleyrodes proletella* (L.) (Hemiptera: Aleyrodidae) along 15km of the Kent coast, individual adults and larvae were found occasionally in association with these species (VC15). However, high numbers (up to five adults or larvae per leaf) were found on heavily whitefly-infested cabbage plants around Dover along sheltered, south-east facing areas of cliff. While the suitability of *A. proletella* as prey has long been established (Bathon & Pietrzik, 1986), the beetle is rarely found in association with even heavily infested cultivated brassicas, presumably due to the ephemeral nature of the crops. Though the presence of *C. arcuatus* on this host plant is unsurprising, it appears that this is the first report of such an association. In 2011, wider recording of whiteflies produced further UK records. In a garden in Greater Manchester (VC58), larvae and pupae were found on Welsh poppy, *Meconopsis cambrica* (L.), feeding on *Aleyrodes lonicerae* Walker. *Aleyrodes proletella* was also present in the area. Small populations were also found on mature honeysuckle (*Lonicera periclymenum* L.) in various woodland and scrub locations across Medway, Kent (VCs15 & 16), again feeding on *A. lonicerae*. Whether these are relict populations, introduced, or the result of range expansion is unknown. The southerly-facing locations and extensive stable populations of host plant and whitefly on the coast would permit long-term occupation, though the influence of international transport should not be discounted. The Medway locations are small fragments of ancient contiguous woodland, while the Manchester site is a former long-term agricultural area. In Germany, the species was believed to have recently spread into urban areas (Bathon & Pietrzik, 1986), presumably due to the advantageous thermal conditions for both the predator and for prey species. In spite of these new records, British populations are most likely small, highly locally distributed and vulnerable to disturbance. The limited diversity and abundance of whitefly species in the UK, which are also mostly specialists at the edge of their range, may be a limiting factor. The species is relatively small, cryptic in habit and is probably overlooked (Shirt, 1987; Hyman & Parsons, 1992). The populations described here were all located through targeted searching of known whitefly host plants, rather than during general surveys; this may be the most efficient method to determine the species distribution in the UK. However, German records include specimens from Malaise traps, car nets, leaf litter and an unoccupied nest box (Pütz *et al*, 2000). If a range expansion is taking place, this species may well prove to be less inconspicuous in the future. We thank the following for their assistance: Max Barclay and Roger Booth at the Natural History Museum, Helen Roy and Peter Brown at the Biological Records Centre, Stephen Atkins at the Greater Manchester Ecology Unit, Tony Witts at the

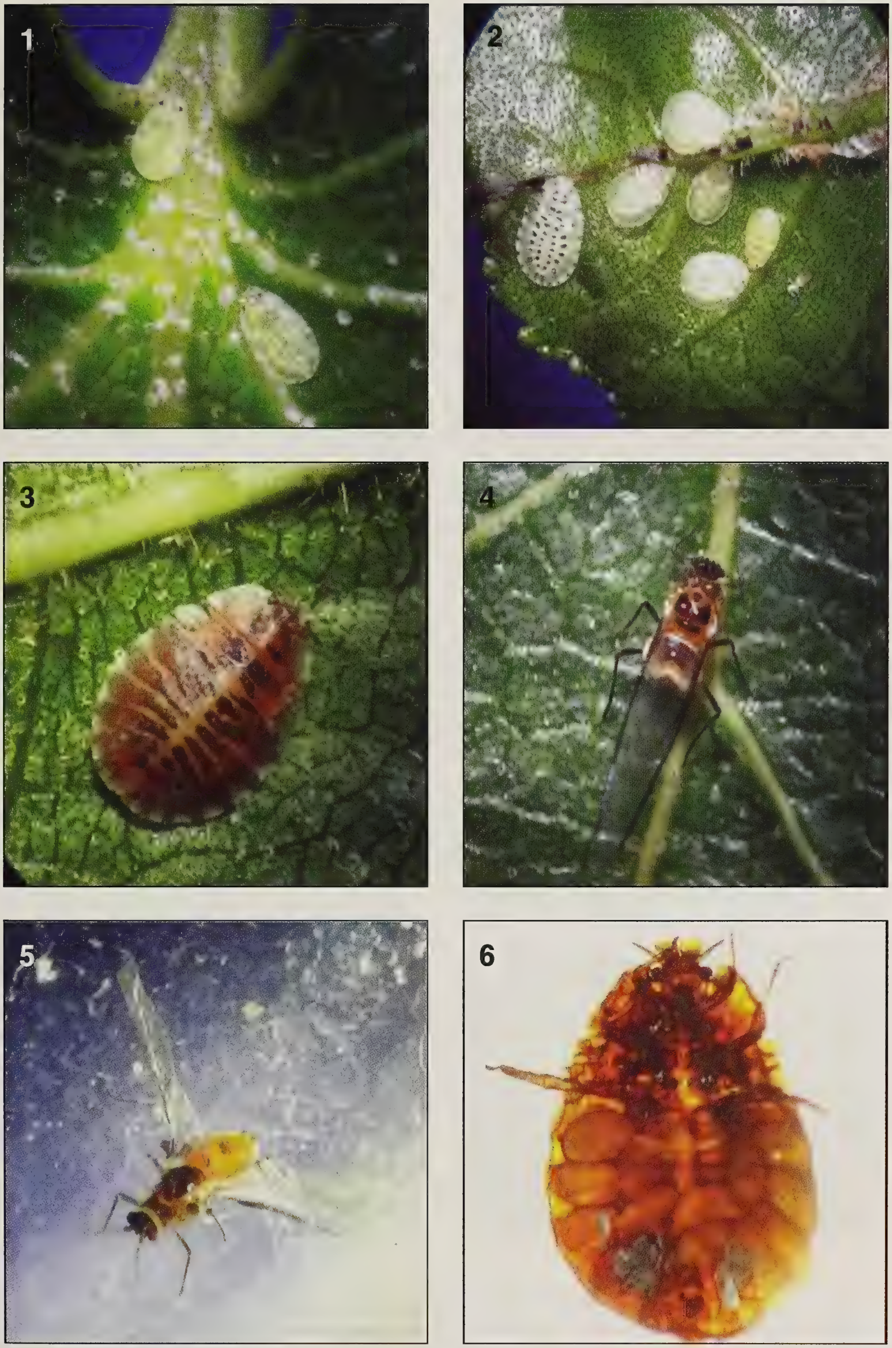

PLATE 13. *Crypturaphis grassii* feeding on leaves of *Alnus cordata*. 1: Immature apterae (body length (BL) approx. 0.50–1.0mm); 2: immature and viviparous apterae (BL approx. 0.50–3.0mm); 3: Oviparous aptera (BL approx. 2.0–3.0mm); 4: Alate (female) (BL approx. 2.0mm); 5: Alate (male) (BL approx. 3.0mm); 6: Oviparous aptera underside (deceased), showing wax glands.

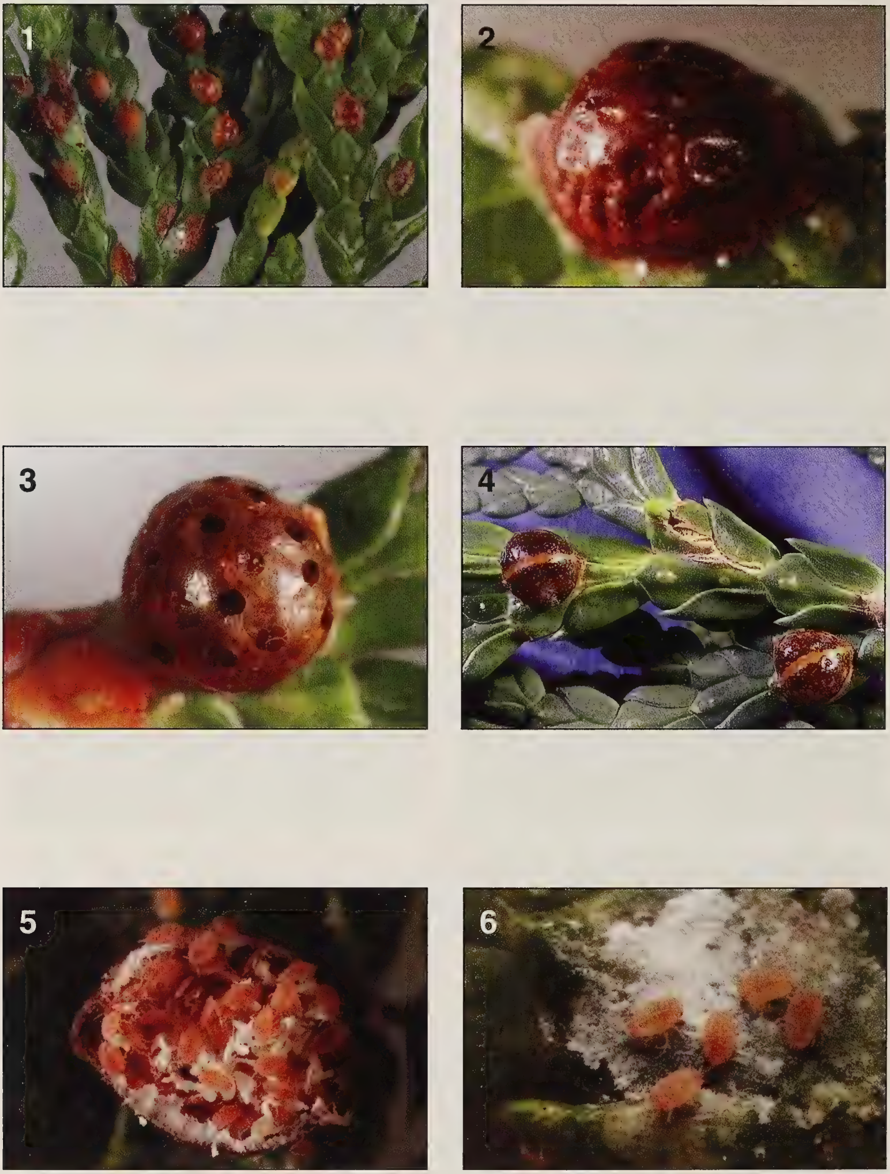

PLATE 14. *Parthenolecanium fletcheri* on *Thuja* © Fera unless specified. Fig. 1. *P. fletcheri* adults. Fig. 2. Close-up of adult female scale. Fig. 3. Adult female scale with parasitoid emergence holes. Fig. 4. Teneral adult scales, each with a dorsal longitudinal pale stripe © David Shetlar. Fig. 5. First-instar nymphs massing in the concave ventral surface of an adult female scale. Fig. 6. First-instar nymphs.

PLATE 15. Fig. 1. Feeding damage to *Aloe* sp. caused by the small mirid bug *Aloea australis.* Fig. 2. Adult small mirid bug *Aloea australis* (body length 2.6mm). Fig. 3. Adult aloe aphid *Aloephagus myersi* (body length 2.5mm). Figs 1–3, © Fera, 2011. Fig. 4. Young adult female of an iceplant scale *Pulvinaria delottoi* (body length 2.5mm). © *www.bugwood.org*. Fig. 5. *Harpella forficella* Barkham, Berkshire, 19.viii.2011 (wingspan 14mm), © N. J. Percival. Fig. 6. The aphid *Prociphilus fraxinifolii*. © Purdue University.

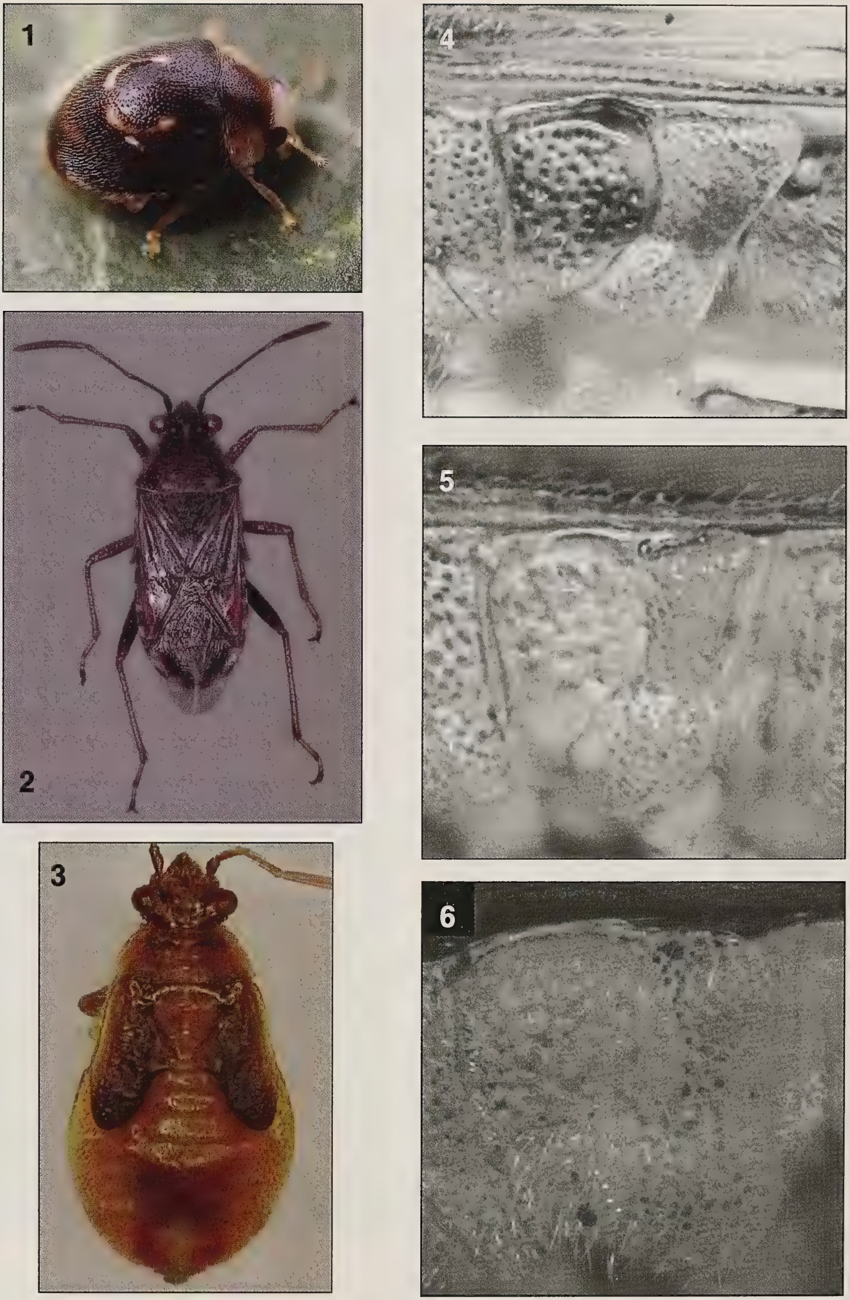

PLATE 16. Fig. 1: Coccinellid *Clitostethus arcuatus* (body length 1.2–1.5mm); © Gilles San Martin. Fig. 2: Rhopalid adult *Liorhyssus hyalinus* (body length 7–8mm); Fig. 3: Fifth Instar nymph of *Liorhyssus hyalinus* (body length 6–7mm); Figs. 4–6: Metapleura of (4) *Liorhyssus*; (5) *Rhopalus* and (6) *Stictopleurus*. Photos: G. Knight.

Kent & Medway Biological Records Centre, and Don Stenhouse and Eric Philp, Coleoptera recorders for VC58 and 15, respectively. Also thanks to Gilles San Martin for the photograph and to Natural England, White Cliffs Countryside Project and the National Trust for permission to survey. – SIMON SPRINGATE & SARAH E. J. ARNOLD, Natural Resources Institute, University of Greenwich, Chatham Maritime, ME4 4TB, UK.

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Over-wintering of *Cionus scrophulariae* (Coleoptera: Curculionidae) in London. – The weevil *Cionus scrophulariae* (L.) is a locally common species in south and east England, with a scattering of records as far north as Argyll and Kintyre in Scotland with a few records from Wales (Morris, 2002). It is one of four *Cionus* species that feeds on figwort (*Scrophularia* spp), principally *S. nodosa* and *S. auriculata* and is

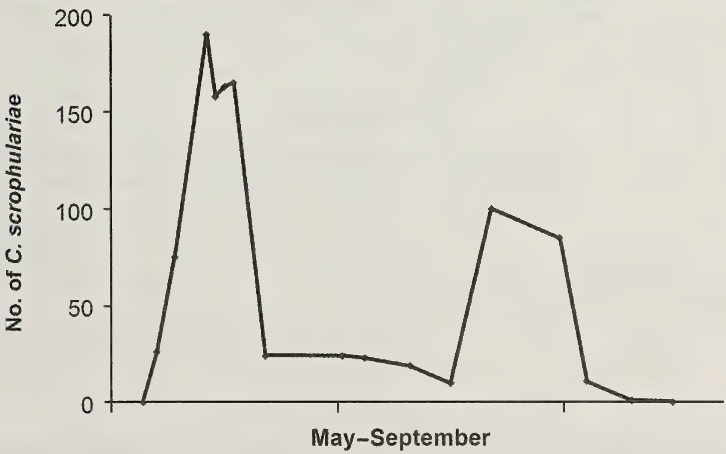

Fig. 1 Numbers of adult *Cionus scrophulariae* on a patch of water figwort on the north bank of the river Thames at Kew Bridge, London, May–September 2010.

commonly found on its host plant in shady places along woodland margins and wetter places such as riverbanks (Morris, 2002).

A colony of *C. scrophulariae* feeding on water figwort *S. auriculata* was studied on the north side of the river Thames at Kew Bridge (TQ 195777) during 2010 (for site details see Curtis, 2010). Regular weekly surveying showed that the numbers of adult weevils peaked in May followed by a new generation of adults in July–August (Fig. 1). I was intrigued to discover where and how the species overwinters as both Cunningham (1975, 1979) and Read (1977) failed to locate where they hibernate in the wild, apart from speculating that 'it (is) safe to assume that this species overwinters in the adult stage'. Additional life history information on *C. scrophulariae* is given by Räther (1989), but he was also unable to locate the overwintering site for this species.

On 6.xii.2010 I found a severe spring tide flooding the Kew Bridge river bank site with the actual tarmac footpath c. 20cm under water, the leafy bases of the figwort plants submerged for an hour and a strong ebb current flowing along the footpath itself. On the following day I searched the only dead floret spike of water figwort that had not been trimmed by a local resident and which remained above the tidal water and found five dormant adult *C. scrophulariae*. Thus this is where some *C. scrophulariae* overwinter. It is likely that if the vegetation had been left intact, as in more normal circumstances, a lot more flowering stems might have been utilised as overwintering sites by *C. scrophulariae*. An experiment at home showed that *C. scrophulariae* is able to survive a short period of immersion; an adult even walking down a stem into water, before climbing out again, so active adults in May and July should be able to survive brief tidal events.

However whether hibernating *C. scrophulariae* on (cut down) figwort plants can survive repeated submergence during cold winter months is more problematical. Prior to entering hibernation *Cionus* weevils are fairly active and Cunningham (1975) found that the related adult *C. hortulanus* (Fourcroy) entered hibernation in saw cuts made in corks placed in the uppermost corners of an experimental cage and suggested that bark high in trees may be the natural overwintering site for this species. There is a maple tree in the middle of the figwort site at Kew Bridge and it is reasonable to speculate that a proportion of the weevils may use this as an overwintering site safe from the effects of flooding, which occurs fairly often during the winter months. – Clive R. Curtis, 3 Cressage House, Walnut Tree Road, Brentwood, Middlesex TW8 0LA.

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THE SCENT-LESS PLANT BUG *LIORHYSSUS HYALINUS* (HEMIPTERA: RHOPALIDAE) – REGULAR MIGRANT OR ESTABLISHED BRITISH SPECIES?

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ABSTRACT

All published and unpublished records for *Liorhyssus hyalinus* (Fabr.) from the British Isles are summarised and mapped. Their increasing frequency is analysed and the current status of the species is discussed. *Liorhyssus hyalinus* was considered a rare migrant to Britain up until the 1990s but is probably now an established breeding species. Diagnostic characters for the adult and nymph are also provided to aid identification.

INTRODUCTION

The scent-less plant bug *Liorhyssus hyalinus* (Fabr.) (Plate 16, Fig. 2) is considered by Dupuis (1953) to be a Palaearctic species that has been introduced into other biogeographical regions. Considerable attention has been devoted to *L. hyalinus*, most recently by Hdradil, Kment & Roháčová (2007) who provided a full literature review, and summarised the species' world-wide distribution and biology, associating it with 172 plant taxa belonging to 38 families, mostly in Asteraceae and Malvaceae.

In both the British Isles and central Europe, *L. hyalinus* has been a very rare species for a long time and is apparently absent from the northern parts of Europe. The northwards expansion of its European range has been charted by Hdradil, Kment & Roháčová (2007) who noted the rapidly increasing number of records in the 1990s from Belgium, Netherlands, Germany, Austria and the Czech Republic, as well as records of migrant specimens from Sweden and Finland.

Southwood & Leston (1959) considered it to be a rare migrant and excluded it from their systematic text and keys. In the British Isles, *L. hyalinus* was first recorded in 1903 – twice in England and once in Ireland (Saunders, 1903; Halbert, 1935) and there are six subsequent pre-1990 records. However, the number of published sightings has increased in the last 20 years (Alexander & Foster, 1996; Denton, 1997; Nau 1997; Hewitt, 2000; Hodge, 2002 & 2004; Judd & Howe, 2004), suggesting a potential change of status similar to that documented for a number of other rhopalid bugs that have appeared or reappeared in Britain in the last few years (Jones, 2004). It is a cosmopolitan pest of many species of low-growing crops (Schuh & Slater, 1995), but not in north-west Europe.

In this paper, all published and unpublished records for *L. hyalinus* from the British Isles are summarised and mapped. Their increasing frequency is analysed and the current status of the species is discussed. Diagnostic characters for the adult and nymph are also provided, to aid identification.

DISTRIBUTION RECORDS

A total of 50 records has been collated for *L. hyalinus* in Britain and Ireland (Table 1). Of these, nine pre-date 1990 and 41 relate to the last 20 years, when the bug was recorded with increasing frequency. *Liorhyssus hyalinus* was sighted in

Table 1. Chronological sequence of *Liorhyssus hyalinus* records in Britain (singletons unless otherwise specified)

Date	Locality	Grid ref.	Details	Recorder
27.vi.1903	Portmarnock, Dublin		Sweeping a grassy bank close to the sea shore (Halbert, 1935)	J. N. Halbert
24.ix.1903	Near Gosfield, Essex,	TL7829	From a marshy place (OUM specimen) (Saunders, 1903)	A. Beaumont
3.x.1903	Norwich, Norfolk	TG20	Sunning itself on a cemetery wall (Thouless, 1904)	H. J. Thouless
1923	County Kerry, Ireland		Sweeping plants in a wood (Halbert, 1935)	E. Bullock
29.viii.1958	Braunton Burrows, Devon	SS43	Breeding colony under storksbill (Woodroffe, 1959)	G. E. Woodroffe
14.ix.1958	Blackheath, Kent	TQ37	On tall garden vegetation - mainly flowering *Aster* sp. and *Solidago* sp. (Allen, 1958)	A. A. Allen
8.vii.1969	Blackheath, Kent	TQ37	Sweeping rough uncut garden lawn (Allen, 1969)	A. A. Allen
28.vii.1985	Freshwater West, Pembrokeshire	SM8900	Two adults under *Erodium* in disturbed, horse-grazed coastal sandy field (Judd & Howe, 2004)	S. Judd
9.ix.1985	Daymer Bay, Cornwall	SW9277	Under *Erodium* on coastal dunes	P. Kirby
20.v.1992	Murlough NNR, County Down, Northern Ireland	J4134	–	A. Foster
16.vi.1994	St David's Head, Pembrokeshire	SM733280	–	K. N. A. Alexander
viii.1996	Oakhanger, Hampshire	SU7736	(Denton, 1997)	D. Porter
16.vi.1996	St David's Head, Pembrokeshire	SM733280	–	A. Foster
15.ix.1996	Sandy Heath Quarry, Bedfordshire	TL204492	Abundant adults on *Erodium* in disused sand quarry (Nau, 1997)	P. Kirby
22.vi.1998	Blickling Hall, Estate, Norfolk	TG22	Arable field margin	A. Foster
14.vii.1999	Porth Ceiriad SSSI, Caernarvonshire	SH313245	Two adults and numerous nymphs underneath *Erodium* in rabbit scrapes on perched dune	S. Judd
1.vii.2000	Head of Ennerdale Water, Cumbria	NY126141	Swept from a marsh (Hewitt, 2000)	S. Hewitt
2.vii.2000	Slyfield, Guildford, Surrey	TQ006523	Several adults swept from flowers of *Sonchus asper* on waste ground with ruderal vegetation, including *Erodium*	P. Kirby
15.vii.2000	Rotherfield Millennium Green, East Sussex	TQ558296	Swept in a damp meadow (Hodge, 2002)	P. Hodge
25.viii.2000	Cople Tip, Bedfordshire	TL097490	Adults frequent on *Erodium* on dry sandy brownfield ground with variable substrate and vegetation	P. Kirby
31.v.2002	Margam Moors, Glamorgan	SS778843	Swept, but no obvious plant association	P. Hodge
20.vi.2002	Westerham Hill, Kent	TQ429558	–	P. Harvey
15.vii.2002	Worlington Chalk Pit, Suffolk	TL701715	Swept from varied low vegetation including *Erodium* in a disused chalk pit	P. Kirby
8.vii.2003	Avis Road, Newhaven, East Sussex,	TQ45350211	Swept from ruderal vegetation (Hodge, 2004)	P. Hodge

(continued)

Table 1. *(continued)*

Date	Locality	Grid ref.	Details	Recorder
28.vii.2003	Battersea Park, Surrey	TQ280772	Newly seeded-grass with annual weeds and bare sandy ground (Jones, 2004)	R. A. Jones
6.viii.2003	Cors Goch NNR, Anglesey	SH501814	Swept from an area of tall sedges in a base-rich fen	M. A. Howe
21.viii.2003	Amesbury Down, Wiltshire	SU146406	Two specimens swept from a flowery patch that included *Matricaria* & crucifer spp.	S. Brooke
5.ix.2003	Near Ardley, Hertfordshire	TL305266	Male on mixed seed crop – predominantly Chenopodiaceae and millet	J. Widgery
8.ix.2003	Freshwater East, Pembrokeshire	SS018981	Adults and nymphs under *Erodium* in trampled dune area	S. Judd
10.ix.2003	Stackpole Warren, Pembrokeshire	SR986946	Adults and nymphs under *Erodium*	S. Judd
10.ix.2003	Gupton Burrows, Pembrokeshire	SR886995	Adults and nymphs under *Erodium*	S. Judd
18.ix.2003	Millyford Green, New Forest	SU2608	From a bog	B. S. Nau
17.vi.2004	Ashdown Forest, East Sussex	TQ4230	Swept off heathland vegetation	P. Hodge
15.vii.2004	St Dunstan's Farm, Heathfield, East Sussex	TQ6019	Swept in unimproved meadow	P. Hodge
9.viii.2005	Leasowe, Common, Wirral, Cheshire	SJ242910	From a recently constructed scrape	J. McGaw
1.viii.2006	Stowe, Buckinghamshire	SP682364	In a disused quarry.	P. Brash
2.viii.2006	Upton Towans, Cornwall	SW53	Two adults under *Erodium* at a sand extraction pit	P. A. Gainey
13.ix.2006	Thames Barrier Park, London	TQ413800	Sweeping	R. A. Jones
2009	Crymlyn Burrows, Glamorgan	SS6992	–	A. Godfrey
26.v.2009	Runnymede, Surrey	TQ007722	In a hay meadow	P. Brash
4.vi.2009	Newborough Warren, Anglesey	SH421622	–	M.A. Howe
5.vi.2009	Morfa Dyffryn, Merionethshire	SH577224	10 adults swept from a sorrel patch in dune grassland	T. Bantock
6.vi.2009	Morfa Harlech, Gwynedd	SH572313	Swept from creeping willow in a dune blow-out	T. Bantock
8.vi.2009	Yaxley, Cambridgeshire	TL191922	Swept from mixed tall ruderal vegetation	P. Kirby
31.vii.2009	Yaxley, Cambridgeshire	TL191922	Several adults swept from flowers of *Picris echioides* in ruderal vegetation on soil mound	P. Kirby
11.vi.2009	Cokeham Brooks, Sompting, West Sussex	TQ167041	A few swept in a small remnant of grassland in the centre of a *Phragmites* reed-bed	P. Hodge
16.vi.2009	Landwyn Island, Anglesey	SH389630	Male and female sweeping rank grassland	R. Loxton
11.vii.2009	March, Cambridgeshire	TL415983	Adults and nymphs common on and around *Erodium* in short open-structured vegetation	P. Kirby
15.vii.2009	Gwithian Towans, Cornwall	SW54	10 adults and many nymphs beneath *Erodium*	P.A. Gainey
26.vii.2009	Dungeness, Kent	TR0619	Under *Erodium cicutarium*	E. Philp
22.viii.2009	Whiteford Burrows, Gower	SS452961	Under *Erodium* on bare sand	M. A. Howe
24.viii.2009	Nursling Substation, Hampshire	SU361116	In sandy bare ground.	J. Claxton

12 separate years between 1990 and 2009 – there were seven records between 1990 and 1999 and 35 records between 2000 and 2009 with 13 records, the largest total for any year, in 2009.

The distribution, range and increasing frequency of records for *L. hyalinus* over time are presented in Figures 1 & 2. It has now been recorded from 47 ten km squares (including two in Ireland) and has a predominantly lowland, southern and eastern distribution, becoming coastal in western areas. There is also one anomalous inland record from Cumbria. Adults were relatively uniformly recorded from late May to September with the earliest record occurring on 20 May and the latest date on 3 October (Fig. 3).

Nymphs are less likely to be recorded than adults because few observers would record them. Nevertheless, they have been recorded on seven occasions between 11 July and 10 September, all but one from sites on the west coast of Britain (Table 1). Multiple site records for adults – another possible indication of breeding, have been noted on 17 occasions. In all cases nymphs were associated with storksbill *Erodium* sp. and adults were directly found on or under this plant on 15 occasions.

Diagnosis

The adult and nymph are most recently described, figured and keyed in Moulet (1995). Jones (2004) also provided a key to the British genera of Rhopalidae including *Brachycarenus* and figured diagnostic characters of the metapleura. Adult colour is extremely variable ranging from nearly black to reddish to pale yellow (Slater & Baranowski, 1978) while Woodroffe (1959) recorded two distinct colour forms in a single colony. All could be superficially mistaken for *Stictopleurus* and *Rhopalus* species in Britain but are distinguished by the length of the forewing membrane, which usually exceeds the tip of the abdomen often by nearly one third of its length (Plate 16, Fig. 2). The length of the forewing membrane appears to be relatively short in some British specimens of *L. hyalinus* and this subject would benefit from further investigation. It would be interesting to determine if there is a relationship between wing length and migratory activity in *L. hyalinus*. Some *Stictopleurus* also have a long forewing but the metapleura are not distinctly divided

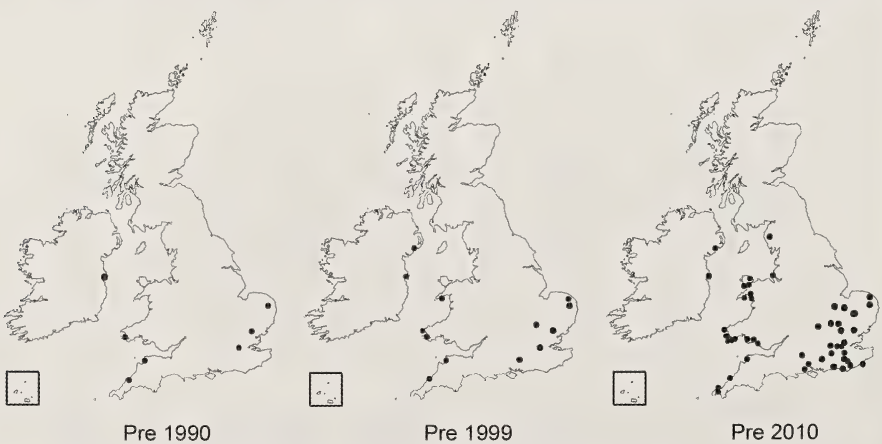

Fig. 1. Cumulative distribution records for *Liorhyssus hyalinus* over time.

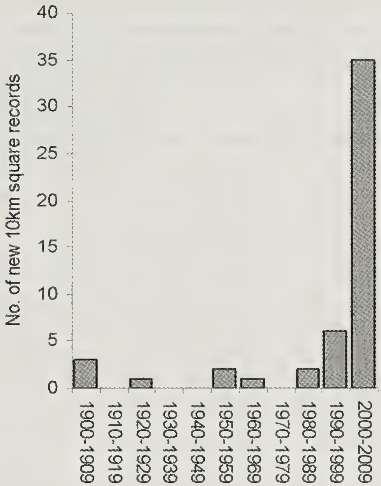

Fig. 2 Summary of distribution records for *Liorhyssus hyalinus* over time.

in two by a pronounced furrow as in *Liorhyssus* (Plate 16, Figs. 4–6) and the puncturation is uniformly sized and spaced, unlike in *Liorhyssus*. *Rhopalus* have a weak metapleural furrow and the forewing does not exceed the tip of the abdomen.

Rhopalid nymphs have dorsal abdominal scent gland openings between terga 4–5 and 5–6 and are separated from all other true bug nymphs by the latter which is displaced forward, a unique and universally occurring character in the family (Schuh & Slater, 1995). The area around the dorsal abdominal gland openings in the nymph

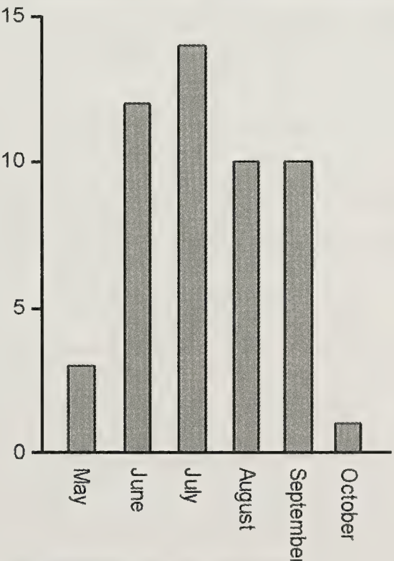

Fig. 3 Adult phenology of *Liorhyssus hyalinus* in Britain.

of *Liorhyssus* is reddish and the lateral pronotal margins are paler (Plate 16, Fig. 3). The nymph is not elongate as in *Chorosoma* or *Myrmus* and is not red with a predominantly black head, antennae, pronotum and legs as in *Corizus*. The lateral margin of the abdomen lacks the very distinctive, two coloured spines of *Rhopalus* or strong, long abdominal hairs of *Stictopleurus* and there are no black bristles arising from large, black dorsal tubercular spots, as in *Brachycarenus*.

Discussion

Studies on the influence of climate change on migratory Lepidoptera provide insight into the range expansion of insects such as *L. hyalinus* to Britain. They are supported by a very limited body of work analyzing the biogeography of true bugs in Britain (Southwood, 1957; Judd & Hodkinson, 1998; Kirby, Stewart, & Wilson, 2001) but their relationship to climate change remains mostly unexplored and poorly understood (e.g. Musolin & Fujisaki, 2006: Musolin, 2007). Recent and projected climate changes are expected to affect faunal assemblages in Britain and seasonal activity and increased migration can be anticipated under a warming climate (Dennis, 1993; Sparks, Roy & Dennis, 2005).

It is evident that *L. hyalinus* was a very rare migrant species to the British Isles during most of the twentieth century, punctuated with what Southwood & Leston (1959) termed 'invasion years' occurring in 1902 or 1903 and in 1958. The presence of nymphs at a site (Woodroffe, 1959) could provide evidence of breeding at this time but these could equally have been the progeny of a fertilised migrant female. It seems most unlikely that the bug was ever an established resident during this time period.

Distributional information assembled by Hdradil, Kment & Roháčová (2007) clearly documents a recent northwards range expansion in Europe for *L. hyalinus* since 1990 and this is supported by the increasing number and frequency of records in Britain, with 13 separate site records in 2009 alone. They attribute this to an increase in above-average warmer years, which could be a consequence of global warming and note similar range expansions of other true bug species (e.g. the pentatomid *Nezara viridula* (L.)) and their possible connection with global warming (Musolin & Fujisaki, 2006; Musolin, 2007).

The ultimate change in the behaviour of a migrant species is to become resident and there is clear evidence for this in the Lepidoptera where some 32 species known to migrate are, or have been at some time, resident in Britain, also overwintering of Clouded Yellow and Red Admiral butterflies has been recorded (Bretherton, 1983; Pollard & Greatorex-Davies 1998; Skelton, 1999; Sparks, Roy & Dennis, 2005). In the case of migrant Lepidoptera, a key factor required for this to happen is the wide availability of larval host plants in the British Isles (Dennis, 1993). This is certainly the case for *L. hyalinus*, which has been associated with 172 plant taxa belonging to 38 families (Hdradil, Kment & Roháčová, 2007) and which appears to be particularly associated with storksbill – a common plant in lowland Britain.

It would appear that *L. hyalinus* was a rare migrant to Britain up until the 1990s and did not sustain breeding populations for more than one year, establishing, at most, transitory populations (Kirby, Stewart, & Wilson, 2001). The northwards expansion of *L. hyalinus* in Europe during the 1990s resulted in an increased number of migrant individuals in Britain and encouraged the establishment of resident populations, which were reinforced from abroad. If *L. hyalinus* is not currently established as a breeding species in Britain, as the body of available information suggests that it probably now is, then it is only a matter of time before it does become so. In addition, rising temperatures will increase the likelihood of migrants taking up

permanent residence here and will also bring source populations of migrants closer to British shores. This has occurred within the Lepidoptera (Sparks, Roy & Dennis, 2005) where such populations function much as a reserve to sustain resident populations in Britain.

The expansion of ranges of individual species such as *L. hyalinus* stimulated by climate warming can enrich local faunas, especially at northern latitudes. However, ongoing warming may further affect the ecology and distribution of true bugs and alter their economic importance (Hdradil, Kment & Roháčová, 2007).

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BOOK REVIEW

A review of the scarce and threatened Coleoptera of Great Britain Part 3: Water beetles of Great Britain. Species Status 1. by Garth N. Foster. 144pp. Published by JNCC, 2010. Softback, £14.99. ISSN: 1473-0154.

This present volume is the first review of the Coleoptera of Great Britain to make use of the revised IUCN quantitative approach to species threat assessment. Until now only the Odonata, Diptera and Butterflies had been given this treatment. The book is well structured and assumes no prior knowledge on the part of the reader. The rationale for assessing species statuses is given in its national and international context as well a useful section on the methodology used in making the assessments.

For each species designated in the highest threat categories (Regionally Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened, and Data Deficient) a data sheet is given with information on: the species current name, sources for identification, distribution information (national and international), habitat and ecology, status, threats, management and conservation. Nationally Scarce species are also listed but without further information.

This document is a welcome update on the statuses given in the British Insect Red Data Book published in 1987. It is important that these reviews are regularly updated so that decisions based on species statuses and designations are founded on a robust scientific evidence base. Free to download from *http://jncc.defra.gov.uk/page-5488*.

Antony Witts

SOCIETY NEWS

Developments at Dinton Pastures

Since the Society moved to Dinton Pastures in 1992 (with the formal opening in 1993), we have occupied two of the three large rooms in the Pelham-Clinton building; a room housing the insect collections and a room housing the library. The third room at the front of the building has been used by Dinton Pastures Country Park as a display area, which has for some years concentrated upon pond life with models, displays, and free literature available. However, when the Country Park no longer required this display area, the Society approached Wokingham District Council with a proposal to buy out the lease for the same period as that on the remainder of the building. Following successful negotiations, the Society has now acquired the use of the former display room, which measures 5.4m by 6m.

Since moving to Dinton Pastures, the Society has organised identification workshops on many groups of insects and other invertebrates, as well as holding open days on one or two Sundays per month to enable members and guests to use the collections and library. The introductory sessions of most workshops, as well as some all day events such as the annual Coleopterists' Day, have made use of the nearby Loddon or Emmbrook Rooms on hire from the Country Park. This has generally worked well, although there have been periods when these rooms have either not been available or have been let to other users ahead of the Society. The new room, within the same building as our existing facilities, will enable us to be self-sufficient for meetings of up to 36 people and thereby we are no longer dependent upon the availability of rooms hired from the Country Park.

BENHS Council appointed a working group in 2010 to consider how to make best use of the opportunities of the increased accommodation at Dinton Pastures for the benefit of members and to promote entomology more effectively. This working group has met regularly since its inception and has drawn up proposals to form a development plan for our future operations at Dinton Pastures. The working group

agreed that the extra space available should be multi-purpose and flexible in operation to enable the Society to extend the facilities available to members and to improve the storage available for collections, library and publications. Hence, the new room has been established as a meeting room, with PowerPoint facilities, chairs and tables for meetings, talks and displays, in conjunction with new storage units to be purchased to hold books and publications. The loft space above the new room will be made suitable for storing boxes of Society publications prior to sale.

In 2010 the working group issued an appeal to members for donations to assist with purchasing furniture and fittings for the new accommodation and for volunteers to help with the practical tasks of decorating and preparing our new room. Members have responded by contributing donations totalling the magnificent sum of £3,878, which has been used to buy the furniture and equipment to fit out the new room. Several members have supported Martin Albertini (BENHS Building Manager) on work days to carry out the practical tasks of removing the old display from the room, then with cleaning and decorating the area so that it is now capable of hosting meetings (the first event held was Coleopterists' Day on Saturday 5 February 2011). Some further building work will be carried out during the winter of 2011 to 2012 to insert a doorway between the new room and the Library and to upgrade the electrical system.

Council is delighted to name the new room *The Graham and Helen Howarth Room*, in honour of Mr and Mrs Howarth who have contributed so much to the activities of the Society over many years. Graham Howarth is now the longest standing member of the Society and his recent very generous donation has enabled the Society to acquire the extra accommodation from the Country Park. It is particularly pleasing to have Graham and Helen Howarth join Teddy Pelham-Clinton as well-known members whose names are now permanently associated with the headquarters of the British Entomological and Natural History Society. There will be a formal opening of *The Graham and Helen Howarth Room* in 2012; an announcement will be made to members in due course.

Members of the working group comprise: Tony Pickles (President), Darren Mann and Glenda Orledge (Vice-Presidents), John Muggleton (Secretary), Martin Albertini (Building Manager), Peter Chandler (Curator), Ian Sims (Librarian) and Ian McLean (Indoor Meetings Secretary).

New members of the Society

The following new members have joined the Society during the past year:

A. Jukes of Kingsley, Staffs; **T. R. Newton** of Kingsthorpe, Northants; **Miss A. R. Backhouse** of Solihull; **A. Lacey** of Denby, Derbyshire; **Mr N. E. Marjoram** of Ipswich; **Mrs T. Marjoram** of Ipswich; **P. Porter** of Bardney, Lincolnshire; **Mrs N. M. Reed** of Tring; **J. O'Sullivan** of Sandy, Bedfordshire; **J. Sutton** of Norwich; **Miss S. Unna** of Camberley; **Mr A. Witts** of Faversham; **A.J. Cunningham** of Tiverton; **Miss R. L. Murray** of Stirling; **P. Patrick** of Stapenhill, Staffs; **Dr D.J.A. Tinling** of Gosport; **G.A. Woods** of Pershore; **D. M. Allan** of Torpoint, Cornwall; **Miss R. L. Evans** of Wallingford; **Mr S. L. Hine** of Earley, Berks; **Dr. D. Sivel** of Peterborough; **Mrs C.L. Truslove** of Reading; **J. Wall** of Basingstoke; **Mr M. P. Toms** of Thetford, Norfolk; **P.G. Baldwin** of Bredbury, Cheshire; **A. Giusti** of Greenford, Middx; **R. M. Harris** of Southampton; **A. Kazantsis** of Ealing; **Ms H. R. Raeburn** of Bristol; **Dr L. A. N. Tilley** of Stainforth, Yorks; **C. Turner** of Cheadle, Cheshire; **Dr P. T. Harding** of Elsworth, Cambs; **J. W. Overton** of Leeds; **Professor S. E. Reynolds** of Mells, Somerset; **Mrs S. P. Wadsworth** of Chippenham, Wilts; **Mrs C. L. Whitehorn** of Stansted Mountfitchet, Essex.

Regional Indoor Meeting, Faversham, Kent, 19 February 2011
Organiser: John Badmin

Over sixty members and friends attended the first indoor regional meeting of the British Entomological and Natural History Society to be held in Kent. The meeting took place at Brogdale Farm, near Faversham, where our hosts, the Kent & Medway Biological Records Centre is based. On arrival members were entertained upstairs in the Record Centre where a hot cup of coffee and biscuits greeted them before gathering in the main lecture room in the courtyard below.

The President, Darren Mann, welcomed everybody to the meeting and then John Badmin and Tony Witts gave a brief account of Brogdale Farm and the Records Centre. Brogdale Farm is home to the National Fruit Collections, the largest collection of fruit trees and horticultural plants in the world. Over 2,200 different varieties of apple, 550 of pear, 350 of plum and smaller collections of soft fruits and nuts are grown on the 70 hectare site. The site is at its busiest in spring and autumn when the plants are in flower or more importantly in fruit, when you can sample some of the rarer cultivars while touring the orchards. The Record Centre moved from the Kent Wildlife Trust's headquarters outside Maidstone to Brogdale about a year ago. KMBRC has been in existence for six years and amassed a total of more than 3.5 million site records making it one of the biggest regional record centres in the country. During this time it has assisted in the production of three county atlases in conjunction with the Kent Field Club. Any members visiting or passing through Kent were invited to call in for a coffee and a chat, or send in their records.

Paul Sokoloff opened the scientific proceedings by talking about 'Recent changes to Kent's Lepidoptera' and drew on examples of recent and not-so-recent changes in

The President Darren Mann explains how to search for oil beetles and how big they are.

Kent, from the geological past to new building developments to illustrate that the time-frames over which change is considered are critical, and that as far as the Lepidoptera are concerned we only have a little over 100 years worth of useful data during which time some species, such as the Black-veined White, have become extinct, whilst others such as the Small Ranunculus were declared extinct at the beginning of the 20th century, but have re-appeared in the county some 90 years later. Many other species have colonised the county through immigration, invasion, introduction and natural extensions of range.

Managing change is critically determined by attitude and, whilst not recommending any particular model, he suggested that lepidopterists and conservationists could broadly be divided into 'change acceptors' who realised nothing would stand still and saw change as an exciting opportunity for study; 'change deniers' who thought that whatever happened, it would not affect them or the way they did things, and 'change resistors' who believed that, even in the face of change, they would try and keep things the way they were. Although controversial, it was worth testing these concepts before deploying scarce resources into protecting local Kent species such as the Heath Fritillary, the Black-veined Moth and the Marshmallow Moth.

Whilst change is often viewed in a negative light, data were presented from a static light trap in the speaker's garden that showed moth diversity over the past 35 years was actually increasing, as was the absolute number of moths recorded each year. However the data masked the fact that, although some 280–320 species were recorded annually at the site, the overall species total was nearly 750, suggesting that the profile of species has shifted considerably.

Examples of species that had colonised Kent were given, including species that fed on Monterey Cypress and Leyland's Cypress whose distribution seemed to follow the planting of these species, albeit after a significant time lag; invasive species such as the Horse-chestnut Leaf Miner; immigrants now established as breeding such as the White-point; those that have expanded their ranges such as the Silver-washed Fritillary and the pyralid *Pempelia obductella* Zeller; to those species such as the gracillariid *Caloptilia semifascia* (Haworth) which has recently become bivoltine in Kent.

Ian Beavis, from Tunbridge Wells Museum, talked about insects of the High Weald and the Museum's insect collections. The High Weald Area of Outstanding Natural Beauty was designated for special protection in 1983. Covering 570 square miles from Horsham in the west to Rye in the east, the High Weald is the fourth largest of Britain's 50 AONBs. Because entomologists now largely work on a county basis, the High Weald has tended to be neglected in recent decades. It is a unique and ancient landscape of rolling hills, small irregular fields, abundant woods and hedges, scattered farmsteads and sunken lanes. Because of its unique landscape features, and its long history of traditional farming and woodland management, it provides a home for many rare plants and animals. Its special climate – damper than the rest of south-east England – supports many species that are otherwise found only on the high ground of western and northern Britain. Deciduous woodland is the most characteristic and most dominant habitat, managed historically by coppicing. The cessation of this traditional form of management by the 1970s led to a rapid closing in of the tree canopy, to the detriment of species relying on open areas. Restoring the coppice cycle, or otherwise opening up clearings is a vital means of managing woodland for nature conservation.

Fritillary butterflies suffered especially as their larvae feed on violets in open clearings. The High Brown Fritillary was formerly widespread: Eridge Park was its last location in SE England, last recorded in 1986. Dark Green Fritillary was also

present. The Silver-washed Fritillary survived, and is now benefiting from improved management on several sites. Small Pearl-bordered Fritillary hung on into the 1990s, but now seems to have disappeared. The story of the Pearl-bordered Fritillary is similar but this species has recently been re-introduced to the RSPB Tudeley Woods reserve. Still widespread and not so dependent on the coppice cycle are species such as the Purple Emperor, White Admiral and Purple Hairstreak.

Many scarce and local hoverflies are associated with the woodland, especially those breeding in decaying heartwood such as *Criorhina ranunculi* (Panzer), *C. berberina* (Fabr.), *C. asilica* (Fallén) and *C. floccosa* (Meigen). *Brachypalpoides lentus* (Meigen) also breeds in heartwood. Others notable hoverflies breed in rot holes, such as the bee mimics *Brachypalpus laphriformis* (Fallén) and *Mallota cimbiciformis* (Fallén). The woods also remain a stronghold for the RDB hoverfly *Rhingia rostrata* (L.).

Choerades marginatus (L.) is a Notable robberfly of ancient woodland which is widespread in the High Weald, along with other specialists such as *Neoitamus cyanurus* (Loew). *Agrilus biguttatus* (*pannonicus*) (Scopoli) is one of several buprestid beetles breeding in dead wood found in the High Weald, another being the purple jewel beetle *A. sinuatus* (Oliver).

Hornets returned to the area in 2002, having been absent since about 1950. Many solitary bees nest in woodland pathside banks and clearings, such as *Andrena clarkella* (Kirby), *A. praecox* (Scopoli) and *A. apicata* F. Smith regularly accompanied by the cuckoo bee *Nomada leucophthalma* (Kirby). Other nesting species include *Andrena bucephala* Stephens (Notable), along with its cleptoparasite *Nomada hirtipes* Péres (RDB 3). *Osmia pilicornis* F.Smith is a declining species and there is concern that it has not been seen for several years in Britain other than in the High Weald (Tudeley Woods in 2010).

The Brogdale meeting, 2011: fore ground, Dr Ian Beavis, Philip Jewess, Tony Witts; second row, Dr John Feltwell and Graham Collins.

The second major habitat in the High Weald is grassland – hay meadows and pastures on farmland, and open areas in woods. Nowadays because of changes in agriculture and forestry, grassy areas in parks, churchyards and larger gardens are increasingly important. There has been a widespread loss of traditional flower-rich grasslands, because on most farms such areas have been 'improved' almost everywhere by ploughing, fertilising and re-sowing with perennial rye grass. There is also the acid grassland found in association with heathland on sites like Tunbridge Wells Common. Such areas are often characterised by large old nest mounds of the Yellow Meadow Ant *Lasius flavus* (Fabr.). Butterflies like the Dingy Skipper, Grizzled Skipper, Small Heath, Small Copper and Common Blue survive along with day-flying moths such as the Six-spot and Narrow-bordered Five-spot Burnets, Burnet Companion, Mother Shipton and Chimney Sweeper.

Hymenoptera of flower-rich grassland include the Notable *Andrena labiata* Fabr. and its RDB1 cleptoparasite *Nomada guttulata* Schenck. The flower bees *Anthophora bimaculata* (Panzer) and *A. quadrimaculata* (Panzer) also frequent grassland, as does *Eucera longicornis* (L.), with its extraordinary long-horned males. Unimproved grassland is also important for bumblebees, including the six commoner species and their associated cuckoos like *Bombus rupestris* (Fabr.) – officially Notable but becoming more widespread, while the BAP species *Bombus sylvarum* (L.) lingers on in the Ashurst / Groombridge area.

Because of its elevation, the High Weald is not especially rich in freshwater features. Most characteristic of the area are the woodland streams running through the narrow steep-sided valleys known as gills. Many artificial features like decoy ponds, ornamental lakes and fishing lakes are also important. Beautiful Demoiselle *Calopteryx virgo* (L.) and White-legged Damselfly *Platycnemis pennipes* (Pallas) are typical here, often breeding in substantial numbers. Golden-ringed Dragonfly is one of the High Weald's predominantly northern and western species, breeding in small streams in heathland and heathy woods. Other significant species include Downy Emerald and Brilliant Emerald.

Heathland is a scarce and declining habitat in S E England. Nowadays, the most extensive surviving expanse is on Ashdown Forest. Ungrazed heathland is liable to be swamped by bracken and scrub, and revert to woodland. Around Tunbridge Wells, former heathland areas on Broadwater and Hargate Forests and at Pembury were largely extinguished by commercial planting of conifers, although heathland vegetation has survived in rides and clearings. On Tunbridge Wells, Rusthall and Southborough Commons cessation of grazing and ornamental planting have had a similar effect. More recently much restoration work has been carried out on sites like these. In many parts of the High Weald there are mosaics of heath and woodland or heath and acid grassland. There is a fluid line of demarcation between wooded heaths and heathy woods, and historically many sites flipped between the two. This has created problems with statutory bodies' definitions when e.g. RSPB proposes heathland restoration on what is technically ancient woodland.

The Silver-studded Blue, a heathland specialist, is now only found in Ashdown Forest. Formerly it was more widespread (Broadwater, Eridge, Tunbridge Wells Common), and current heathland restoration will provide opportunities for reintroduction. Beautiful Yellow Underwing *Anarta myrtilli* (L.) is widespread on even quite small heathland areas, the larvae more often seen than the moth.

Adults of Green Tiger Beetle are frequently seen running and flying over bare rides and patches of sandy ground in the spring, with their larvae later in the year in burrows in the same sandy ground. Their larvae are attacked by the nationally scarce parasitoid *Methocha articulata* (Latreille). Glow worms still widespread, though not

often seen, as no one walks unlit lanes any more. In 2009 the Lesser Glow worm *Phosphaenus hemipterus* (Goeze) appeared on Rusthall Common, one of only a handful of modern records of this enigmatic species.

In heathy woods, the mounds of the Wood Ant *Formica rufa* L. are often frequent, accompanied by other species like the tiny guest ant *Formicoxenus nitidulus* (Nylander), the chrysomelid beetle *Clytra quadripunctata* (L.), whose larvae live in the ant mounds, and the ladybird *Coccinella magnifica* Radtenbacher. *Formica sanguinea* Latreille, the 'slave-making ant', was studied by Charles Darwin here and remains in the area. It raids nests of other ant species especially those of *Formica fusca* L.

The Woodland Grasshopper *Omocestus rufipes* (Zetterstedt), is a rare insect of heathland and open woods and a Wealden speciality. *Bombylius discolor* Mikan, an uncommon relative of the familiar bee-fly *B. major* L., regularly occurs here. *Colletes succinctus* (L.) and its cuckoo *Epeolus cruciger* (Panzer) belong to a characteristic suite of heathland solitary bees characterised by a close association with heather for nectaring and pollen gathering. *Andrena fuscipes* (Kirby) and *Nomada rufipes* Fabr. also occur, with even small remnant heather patches retaining populations.

The bumblebee *Bombus jonellus* (Kirby) is closely associated with heathland habitats, peaking in high summer when workers forage from heather. *Nomada signata* Jurine is a RDB2 species with a stronghold on the commons around Tunbridge Wells. Oddly it is a cuckoo of the common mining bee *Andrena fulva* (Müller in Allioni). RDB3 *Nomada fulvicornis* Fabr. flies with it, but is somewhat more widespread. Sandy bare ground around rocky outcrops supports large nesting populations of species like *Andrena barbilabris* (Kirby), and nests of the sphecid *Ammophila sabulosa* (L.).

The speaker concluded his talk with a short account of the Natural History section in Tunbridge Wells Museum. Natural History has declined in regional museums in recent decades and the museum's focus has been to emphasise the links with conservation and Tunbridge Wells Borough Council's green agenda – one of its corporate priorities. It can be a source of 'good news stories'. This approach does engage senior managers and politicians. The Museum was founded in 1885 by the Tunbridge Wells Natural History & Philosophical Society, and adopted by the Borough Council in 1918. The Natural History Society, led by geologist George Abbott, the Museum's first curator, ran field and indoor meetings covering the whole range of natural history including entomology. The Museum's collections include a comprehensive collection of British macrolepidoptera, pyralids and tortricoids. The Blest collection has mainly bred examples of British butterflies. Roy Crowson, the famous Coleoptera taxonomist, worked at Tunbridge Wells Museum before World War II and built up a collection of 9000 specimens from the High Wealden area. Entomology continues to feature extensively in the Museum's outreach programme, which includes talks to local groups and guided family nature walks in the local countryside. Local partnerships include those with the High Weald AONB Unit, the Kent High Weald Partnership, Kent Wildlife Trust, Bumblebee Conservation Trust and RSPB.

David Gardner gave an illustrated talk about the issues involved in drafting the anticipated book on the Lepidoptera of Kent. This required checking field records as they came in, discussing the likely errors of identification and odd dates of sightings. Also deciding on the best ways of preparing species' accounts with suitable maps that illustrate how species' distributions are linked to hostplants, soils and habitats, or to man-made features such as gardens, urban planting schemes, roads and railways. A good map can replace many words. There was also the need to compare long-term

monitoring data sets from regular sites such as the Rothamsted and garden recorder locations with wider field work. The bias of different sampling methods on species' distributions such as the use of light-traps of different designs and light spectrum versus leafmine investigations, daytime sweeping and leaf sieving required taking into account. A few lepidopterists were using pheromone lures for recording purposes whereas previously the presence of a moth would have required more intensive field searches, so any changes in status for these moths are tricky to interpret. One has to recognise that some contributors record certain species enthusiastically as they get their eye in, possibly to the detriment of other species, but once a species is recognised a whole lot more records can follow. As an example, leafmine searches went from one Kent record of the nepticulid *Ectoedemia spinosella* (Joannis) at Dartford Heath in 1985 to records form Darland, Welland Marsh, land north of Sittingbourne and Faversham and the Hoo peninsular and Yalding all in 2009. The recording committee, having sight of the most up-to-date maps, also has to take on the role of persuading recorders to visit less well-studied areas or to look for possibly under-recorded rather than rare species. Records are still being accumulated so the book's publishing date has not yet been decided upon – thought about, yes!

Greg Hitchcock, from the Kent Wildlife Trust talked about 'The invertebrate diversity of Kent's brownfields'. Although there are many brownfield sites scattered across the county, the speaker concentrated on an area that has become known as the 'Thames Gateway'. This turns out to be is one of the hottest, driest, most 'Mediterranean' parts of the British Isles. A significant number of species in the area are on the north-western edge of their European range and are found nowhere else in the UK, for example, the extremely local ant-eating spider *Zodarion italicum* (Canestrini). From the geology and topography, from the chalk downs sloping down to the London clays of the coast, arise a range of habitats from ancient woodland to grazing marsh, and of course the Thames and Medway Estuaries. The area is also incredibly polarised, with the big open spaces on the Hoo Peninsula and the North Kent Plain contrasting with the dense conurbations of Dartford and Gravesend and the Medway Towns. Species of importance include the scarce bumblebees *Bombus sylvarum* and *B. humilis* Illiger and the weevil-hunting wasps *Cerceris quinquefasciata* (Rossius) and *C. quadricincta* (Panzer). However there is little space in the urban areas, no 'waste' land, and the needs of the human population (or more accurately 'the drive for short-term economic gain') and the needs of wildlife often come into conflict. Increasing threats from climate change and changes to national planning policy are likely to escalate these conflicts. This is driving the need to reconnect fragmented habitats to allow wildlife to react to change; conservation on a landscape scale, such as through the Wildlife Trust's Living Landscapes approach.

John Badmin talked about Colonel Duffield's Sharpshooter: a UK endemic. Despite many invertebrate surveys of the Dungeness peninsula, few have concentrated on studying the ecology of resident coastal and shingle-adapted insects. Some detailed surveys have been undertaken on bumblebees (Williams, 1989), moths (Sterling & Speight, 1989; Parsons & Waring, pers. comm.) and froghoppers (Badmin, 1996). This overall lack of detailed ecological surveys is surprising since a high proportion of local and nationally rare invertebrates inhabit shingle (Packham & Willis, 1999; Shardlow, Buglife). Several shingle adapted leafhoppers, lace-hoppers and a froghopper occur in appreciable numbers at Dungeness.

Lieutenant-Colonel Duffield, a BENHS member, was especially interested in Hemiptera and recorded extensively in Kent in 1920s-1960s. He discovered a

leafhopper (sharpshooter) new to the UK in the vegetated shingle at Dungeness in 1919 and Walter Le Quesne subsequently described it as a species new to science, *Aphrodes duffieldi* Le Quesne, in his honour. It is an enigmatic species and has only been recorded on five occasions since its discovery to 1957. Walter Le Quesne failed to rediscover the species on a Royal Entomological Society/Kent Field Club excursion to the ness in 1979. Pitfall traps used in an extensive survey of the area's invertebrate fauna for English Nature in 1988 revealed the leafhopper was still present at a scattering of sites, mostly along the eastern seaboard, rarely inland. In 1999 it was discovered in pitfall traps at Lydd Ranges on the southern side of the peninsula. Preliminary studies have suggested *A. duffieldi* may be conspecific with either *A. assimilis* (Signoret) or *Anoscopus alpinus* (Wagner) but there are slight, but distinct differences between the male aedeagi of all three and a proper re-assessment of the group is required.

The first live individuals since the 1950s were found by the speaker in 1997 and so it was decided to attempt a more detailed study of the leafhopper. But where to start? Dungeness consists of five beaches separated by marshes. The beaches are made up of shingle ridges, each deposited above extreme high-water spring tide level by storms at the time of formation. Successive ridges have linked to form a peninsula comprising 500 or so ridges, the oldest being about 3500 years old. The succession of plant communities at Dungeness, from pioneer coastal to mature inland shingle ridges has been described by various authors, the most recent study by Ferry (1989). Pitfall traps were placed in ridges and furrows across the foreshore at Lydd-on-sea and inland along a transect line by Kerton Road close to the one used by Brian Ferry. The results showed that *A. duffieldi* occurred mainly on the vegetated shingle ridges of the foreshore. Related studies showed the leafhopper's hostplant was false oat grass *Arrenatherum elatius,* where it feeds mainly on the stems at or below ground level. The choice of *A. elatius* is important, because, although it is a rare plant of shingle (but not at Dungeness), its long roots are capable of providing an ample supply of water during most of the spring and summer months when the leafhopper is developing. Other shingle grasses by comparison are much more ephemeral and tend to die back by early-summer. More individuals of *A. duffieldi* were found in larger clumps of vegetation containing a high proportion of *A. elatius* than in small, isolated clumps. The leafhopper was found at a few sites inland towards the airport where patches of false oat grass were growing in primary shingle.

The final speaker, Richard Moyse of the Kent Wildlife Trust, presented information he had gathered while putting together evidence for the Planning Inquiry into the proposed airport expansion at Lydd on Romney Marsh. Lydd Airport is immediately adjacent to the Special Area of Conservation at Dungeness, and the airport boundaries include vegetated shingle within the Dungeness SSSI. The vegetated shingle at Dungeness is very well known for its assemblage of rare and threatened invertebrates, which includes a number of endemic taxa, including the bug *Aphrodes duffieldi*, for which this is the only known UK site. The potential impacts of the airport upon invertebrates were not through land-take, but through increased nitrogen deposition, which could potentially impact on plant growth and plant competition, thus altering the composition of plant communities and their associated herbivorous insects, and increased lighting, which might affect moths and other nocturnally active insects. He explained how the relatively small amount of relevant research undertaken in these areas made it hard to be clear about the *probability* of a deleterious impact, even where the *possibility* of an impact was clear. This may be an important factor in the difficulty of defending species through the planning process.

Hogmoor Inclosure, Whitehill, Bordon, Hampshire, 4th September 2010

Leader: Stephen Miles. – Permission was once again obtained from the owners, the Ministry of Defence and the Longmoor Conservation Group, for this, the third consecutive year of moth trapping organised by the leader at this site. The area chosen for the use of light traps was 300m east of the site's western edge, within a small area of open heather used during the previous two meetings.

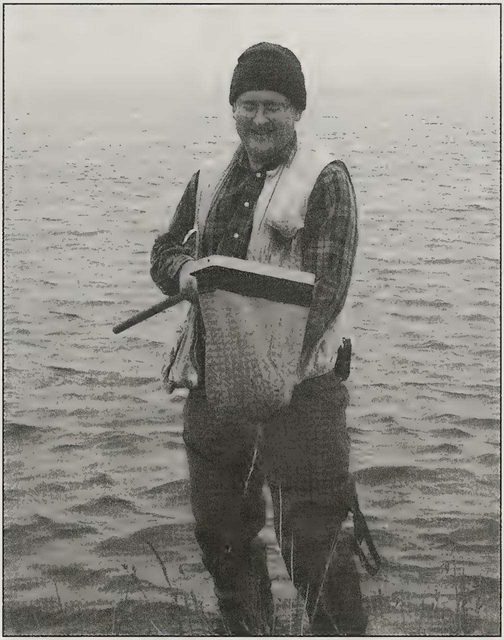
The habitats present on this site are heathland with deciduous and coniferous woodland and scrub; it is also a local Site of Interest to Nature Conservation (SINC). It is currently an Army tracked-vehicle training site but continually threatened by building development encroachment on its eastern edge despite its SINC status. Its future now appears to be that of a Suitable Alternative Natural Greenspace (SANG) for free-running dogs, so that hopefully they and their owners come here rather than damaging the European designated Special Protection Areas (SPA) that surround Bordon. The meeting was organised as a joint meeting of the Alton Natural History Society (ANHS) and the British Entomological and Natural History Society (BENHS). The purpose was for moth recording and general natural history observation to obtain more site information for the Local Biodiversity Action Plan. Fortunately, once again, it was mainly dry and the evening was warm, still and humid.

Three members of Alton NHS in addition to the leader turned up plus two other local moth enthusiasts; the leader was once again the only BENHS member. The fungus, Shaggy Ink Cap, *Coprinus comatus* (Müll. Ex Fr.) which is a species of disturbed ground was recorded by the ANHS members. This fungus, by the way, should not be eaten whilst drinking alcohol as it inhibits its breakdown and the effects of drunkenness may persist for long periods. Two mv lights were run by Bill Wain and Nick Montigriffo, one in a shaded position under mature pines surrounded by bracken, the other in open heathland. Actinic light traps were also run individually by David Hamilton and the leader. In all 42 species of moths were recorded; this included one notable (Nb) species, *Crambus hamella* (Thunberg) of which five were trapped (see the excellent photograph by Nick Montigriffo in the publication produced by Butterfly Conservation and entitled, 'Hampshire and Isle of Wight Butterfly and Moth Report 2010'). Its larvae are believed to be associated with the grasses of dry heathland so this site represents one of its typical habitats. This moth was not only new to the site but also represented a new 10km square record.

A single example of an Archer's Dart, *Agrotis vestigialis* (Hufnagel) was taken by Nick Montigriffo at his mv light in the last minutes of the meeting. Nationally this is either coastal or a species of inland heathlands. It was last recorded from the SU7834 tetrad prior to 1980 but it has been taken at several nearby sites by other enthusiasts in more recent years. The leader also recorded one specimen of the Feathered Gothic, *Tholera decimalis* (Poda), a species that seems to have recovered from periods of scarcity that it experienced some years ago in southern England.

Twenty-four moth species were new post-2008 records for the site, 17 were microlepidoptera new to tetrad SU7834 – so the meeting may be considered a most successful one.

OBITUARY



DEREK LOTT
28 September 1953–19 June 2011

Derek Lott, whose death in June after a long fight against prostate cancer, brought to an end the work of a consummate entomologist. After graduating with a B.A. in chemistry from Balliol College, Oxford in 1976 and a postgraduate Cert. Ed. at Warwick in 1977, he took up a post in Leicester to teach science. With a life-long interest in natural history, Derek started to develop a keen interest in Coleoptera, and in 1983 decided to leave teaching and enter the Leicestershire Museum Service as a curator of collections. Here his knowledge of beetles and his systematic approach to collection organisation and data recording led to an innovative approach to collection management. It was from his work in the Coleoptera collections at Leicester that he developed his appreciation of the old Leicestershire coleopterists, a largely unknown group who made significant collections for the East Midland area. The knowledge gained from archive sources and collecting note-books culminated in the splendid 2009 publication *The Leicestershire Coleopterists: 200 years of beetle Hunting*. During his time at the museum he became Beetle Recorder for the county, a position that he held until his death. He amassed thousands of records that he made sure were transferred to the NBN data banks, an achievement recognised in 2010 by his being made an Honorary Member of the NBN Trust.

Though he started on his entomological career with a general interest in all beetle groups, he quickly focussed on certain families that were to provide the basis for much of his later work, the Carabidae, water beetles and his final passion, the Staphylinidae. Despite working mainly alone, Derek was a very sociable person and the companionship of the Balfour-Browne Club became very important to him,

leading to life-long friendships, foreign excursions and international contacts. His focus on these three gave him the depth of knowledge and experience which he turned to good use when he chose for his Ph.D. thesis to study the insect communities of river margins, being awarded a doctorate by the University of Durham in 1999. This work confirmed him as an authority on the insect communities of river banks and has under-pinned much of the management of these habitats by national organisations.

In 2004 Derek retired from the Museum Service to become an independent entomological consultant. This was a major step but he became much sought after for his high quality work and reports. He was employed by national conservation organisations to survey and assess nationally important sites and through this aspect of his work became extremely knowledgeable on the saproxylic beetle assemblages of old forests and parklands, a habitat that he came to appreciate for its richness and fragility in the face of modern pressures. An area that he was very interested in was the role of ancient trees in hedgerows as reservoirs and corridors for rare saproxylic species.

His survey work and data recording will be influential in the future but it is for his work on the Staphylinidae that he will be most remembered. Gradually becoming a passion with him, he chafed at the lack of keys to enable his chosen group to be accessible, and he set about writing his handbooks for the R.E.S. The fact that he started on this project during the onset of his illness makes his efforts all the more remarkable. In 2009 he produced *The Staphylinidae (rove beetles) of Britain and Ireland. Part 5: Scaphidiinae, Piestinae, Oxytelinae*, followed in 2011 by the second part, *The Staphylinidae (rove beetles) of Britain and Ireland. Parts 7 & 8: Oxyporinae, Steninae, Euaesthetinae, Pseudopinae, Paederinae, Staphylininae*, which he co-authored with Roy Anderson who was responsible for the Steninae. These two volumes have been very well received by his fellow workers on Coleoptera and it is sad that he did not live long enough to tackle the Aleocharinae, a task that coleopterists must address with urgency. Derek's works are meticulous and detailed with an emphasis on clarity and ease of use. They are illustrated by fine diagrams of diagnostic features using a technique he perfected and superb colour photographs. Luckily he was able to see his last volume published and saw the many good reviews.

Derek focussed mainly on the British fauna, also collecting Staphylinidae in Ireland and across Europe, often while attending B-BC excursions, and by attendance at international Staphylinidae conferences. He formed many friendships with European specialists, exchanging material and papers. He travelled and collected outside Europe, visiting the USA where he made many contacts, including a friendship with Lee Herman, whose detailed work he admired very much. Two trips to Burkina Faso 2003–2004 resulted in an important revision of the staphylinid genus *Acylophorus* in which Derek revised the synonymy and erected a number of new species.

His national and international reputation as a Staphylinidae expert did not prevent him remaining loyal to his roots in Leicestershire: county recorder for beetles, tireless worker on the local Wildlife Trust, a trainer at workshops both in county and at Dinton Pastures for the BENHS. He always found time to help with identifications and to encourage new entomologists. Derek was an energetic field worker and he has made a significant contribution to our knowledge of the British beetle fauna. His collection of Coleoptera has been accepted by the Natural History Museum in London, along with his notebooks and correspondence.

Our condolences are with his wife Beverley whom he married in 1977, daughter Anne and son John, and his parents. Derek delighted in his family, their

achievements and their marriages, particularly valuing the celebrations with them allowed to him in the latter years. He was a fine friend and colleague to many entomologists, with a great sense of humour and enjoyment of life. In so many ways he will be sadly missed.

A. B. Drane & G. N. Foster

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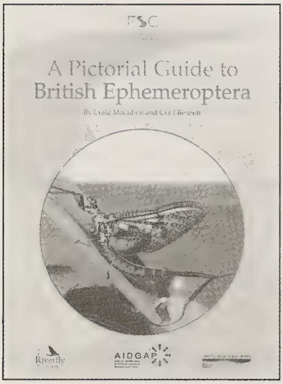
BOOK REVIEWS



A Pictorial Guide to the British Ephemeroptera by Craig Macadam and Cyril Bennett. 110pp. (AIDGAP, Field Studies Council, 2010). Softback £15.00. ISBN 978-1-85153-277-3.

This guide has been produced by the Riverfly Partnership in association with the Field Studies Council and is a typical AIDGAP key with which we are all familiar. The text and keys were developed by Craig Macadam (Ephemeroptera Recording Scheme organiser), with colour photographs taken by Cyril Bennett and line artwork by Rory McCann.

The introductory section describes the basic life cycle of mayflies, including the special sub-imago stage, diagnostic features for identifying adults and nymphs, collection and preservation techniques and a checklist of British Ephemeroptera. Since the publication of the Freshwater Biological Association keys (1954–1988) and Harker's Naturalists' Handbook (1989), three species have been added to the UK list (*Electrogena affinis* (Eaton), *Caenis beskidensis* Sowa and *Caenis pseudorivulorum* Keiffermüller) together with seven name changes. All fifty-one species of mayfly recorded from the British Isles are covered.

The pictorial charts are multi-choice, using a combination of whole insect and close-up colour photographs of live individuals and line drawings of critical features and are all easy to follow. Adults and nymphs of each family are keyed separately. Some of the female imagos can only be separated to genus level with certainty and sub-imagos of either sex are often difficult to name without additional information. Each species account covers a page and includes additional diagnostic information, adult emergence periods(s), details of habitat and ecology, and distribution. The maps are simplified using two-tone red to denote common or localised distribution or absence (blank). The need for voucher specimens (not photographs) of species found outside their main areas of distribution is continually stressed. The mini-maps are a major advance on previous works where, for example, one species is challengly described as 'common, but local on large, rapid rivers, not recorded from the Lake District', leaving a lot of questions unanswered!

The pictorial guide is not intended as a replacement for the FBA key or Naturalists' Handbook, but to assist enthusiastic amateurs to attempt to identify mayflies primarily using live specimens. The authors are to be commended for producing a very useful addition to the small pool of books available in the UK on Ephemeroptera. For most of the past century there has been a great divide between land and water-based entomologists, with the latter preferring to record nymphs in situ, whereas the vast majority of mainstream entomologists wish to record adults. This fault line has undoubtedly held back the study of mayfly distribution in the UK: this book should go a long way to redressing this problem. A checklist of species with a list of synonyms in addition to currently accepted names would be useful in a future edition.

John Badmin

The Royal Entomological Society Book of British Insects by Peter C. Barnard, 2011, xi + 383 pp. Wiley-Blackwell. Hardback, RRP £39.95. ISBN 978-1-4443-3256-8.

The Royal Entomological Society of the title is that of London and the author is one-time editor of that Society's *Handbooks for the Identification of British Insects.* Both have a long history of service to entomology in the global context and to studies of the British insect fauna. The author's stated intention is to make this book both a key reference work for the professional entomologist and a readable and attractively illustrated account for the interested student.

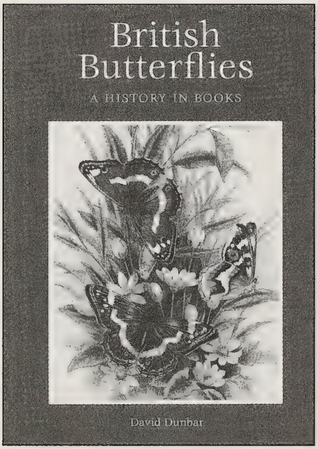
In essence the book is a summary of what is known about the systematics and biology of British insects. For every family there is a necessarily brief account of the usual habitat of its members and their feeding preferences and other notable behaviour. The names of all British genera are listed, usually grouped under their respective subfamilies. As the work is fully indexed, it is possible, knowing the generic name of an insect, to find its place in the systematic hierarchy and at least an inkling of its biology in a few seconds. All the illustrations are full-colour habitus photographs, the number of which somewhat exceeds the number of families, so there is a reasonable chance that the user will also get an idea of the general appearance of the insect behind the name.

A major feature of the work is its bibliography or rather bibliographies, one for each order. Sometimes the references in these are to individual works but often they refer to the relevant parts of *Identifying British insects and arachnids: an annotated bibliography of key works* (edited by Barnard himself, published in 1999 by Cambridge University Press). It is really only by consulting the two works together that users will become aware of the gaps in the literature on identification and, perhaps, be inspired to fill some of them, a declared subsidiary aim of the *Book of British Insects.*

The arrangement of the information is relentlessly systematic. Chapter 1 concludes with a summary of the taxonomic arrangement adopted, down to Family level. The remaining 27 chapters cover one Order each and follow a common plan. A general treatment of the Order contains a brief descriptive account, a discussion of the available literature, a panel repeating the classification down to Family, this time adding the number of British genera and species in each, and a list of the species that are protected under the Wildlife and Countryside Act 1981 and those for which by Biodiversity Action Plans exist. Then follow the family accounts with lists of genera. Finally there are full bibliographic references to the works referred to in the text and the addresses of any relevant websites.

How well does the *Book of British Insects* succeed in its primary aims? As a reference work, its authority and integrity are indisputable. Both the composition of the British insect fauna and ideas on classification are constantly changing. Like all reference works, it must inevitably become out of date but it will undoubtedly retain its usefulness for many years to come. As to its readability, it is difficult to imagine anyone reading the book from cover to cover. Nevertheless, it does furnish an informative and well illustrated general introduction to the many groups that lack popular guides. The idea for the book was proposed by the Hon. Secretary, John Badmin.

W. R. DOLLING



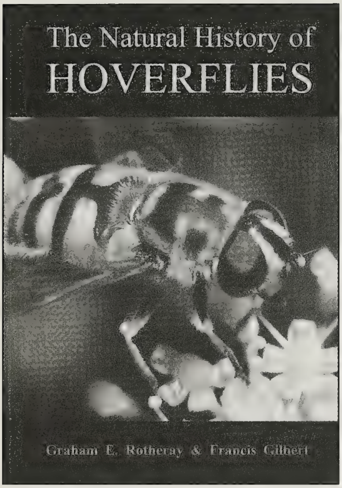
British Butterflies: A History in Books by David Dunbar.178pp. (The British Library, 2010). Hardback £45.00. ISBN: 9780712350969.

More books have been written about British butterflies than there are species in the British Isles. This fact is neither surprising nor worrying, butterflies are undeniably beautiful and we simply wish to know more about our native fauna. This book is entirely different from the rest though as its aim is to trace the history of books written about British butterflies. The author provides us with a magisterial overview, based on his life-long involvement in dealing with natural history books. The whole spectrum of butterfly-related literature is covered, from books recording the earliest discoveries of butterflies in the British Isles to contemporary scientific works on ecology and conservation. Beginning with Thomas Moffet's *The Theatre of Insects* in 1634 the book guides the reader through 400 years of publishing on butterflies, giving extensive bibliographical information and descriptions of some 600 titles. The book is richly illustrated with colour plates from our earliest reference books to present day treatises. Each generation uses the latest technology: in the early 20th century Frederick Warne & Co. Ltd exploited the new, mechanical, three-colour printing process to publish the exceptionally popular Wayside & Woodland series on British insects including Richard South's 'Butterflies'. This marvellous book with numerous impressions, revisions and reprinting was in print for over 70 years. Photography was little used until S. Beaufoy published his *Butterfly Lives* in black and white in 1947, followed by *Butterflies of the Wood* with colour photographs in 1953. Advances in photographic techniques brought about first by single lens reflex and then by digital cameras, combined with improvements in cheaper colour printing have led to a flurry of high class books on butterflies in recent times.

Later chapters cover books dealing with butterfly biology and ecology, species variation, conservation, distribution mapping schemes, and regional and county atlases. Butterfly gardening, now a popular and increasingly important subject, began with the publication of *Create a Butterfly Garden* by L. Hugh Newman in 1967. I was surprised to learn just how many books have been written on this subject since. The concluding section on butterflies and art covers the illustration of butterflies on wall charts, cigarette cards, postage stamps and other media. This should remind us all how important artists have been in developing our appreciation of butterflies, for we have relied on them, possibly more than the authors, for accurate identification of our butterflies.

The book is a remarkably concise, extremely well-written compilation about books about butterflies. Many of the titles were new to me, despite a life time browsing in natural history book shops and it was a delight to read of their existence. Butterflies in landscape paintings is touched upon, not extensively, and could be the subject of another book – this has particular resonance, for, as a child I was captivated by a watercolour of *Hope Cove, Devon* painted by my uncle S. R. Badmin published in *The British Countryside in Colour* (c.1950) with clouds of butterflies (small copper, gatekeeper and meadow brown), and had to visit. They occur there today.

John Badmin



The Natural History of Hoverflies by Graham E. Rotheray and Francis Gilbert. 334 pp., 35 plates. (Forest Text, 2011). Paperback *c.* £32. ISBN: 978-0-9564692-1-2.

'The Natural History of Hoverflies' is a welcome addition to the increasing list of publications dealing with the biology of insects. With an absence of distribution maps, species lists and keys, this book is concerned instead with what hoverflies do, how they behave and why. Written by two acknowledged experts in the field, each chapter draws on both published and new information and as such is a self-contained essay on a particular subject that can be read in isolation. References are given, but these are not overdone and do not affect readability. The plates, mostly colour, are of good quality and are where they should be – in with the text.

The book starts with a general introduction to the family as a whole, giving a basic description of hoverflies and their anthropogenic connections. Also included is an outline of the three sub-families: Microdontinae, Syrphinae and Eristalinae, which are dealt with separately in subsequent chapters, thus forming a common theme throughout the book. Chapter 2 covers the morphological features of adults and how these features enable them to respond and react to their environment. The third chapter does the same for the early stages, but also covers the dearth of knowledge of these stages and discusses reasons why this may be.

Chapter 4, entitled 'Origins, Features and Faunas' essentially covers evolution, family classification and the relationship with other dipteran families, on a worldwide basis. Much remains to be discovered before the exact intra-family relationships are fully determined; this chapter explores these issues. Covering hoverflies in Europe and Britain, chapter 5 brings the discussion closer to home. Issues such as their origin and how colonisation proceeded as the last ice age ended are discussed. Despite being well covered with respect to other parts of the world, new species are still being discovered. The unstable nature of syrphid taxonomy is therefore mentioned again, along with the need to recognise this and the effect it has on the naming of species. For those who are frustrated by name changes – it's not over yet. British residents, summer visitors, occasional visitors and introductions are covered, with the chapter concluding with key works and recent additions to the British fauna.

Chapter 6 covers the use of colour, which, as the authors state, is employed for defence, thermoregulation and communication. The chapter commences with the intensely popular subject area of mimicry as a defensive strategy. The evolution and effectiveness of mimicry are debatable and a discussion on the issues and problems is included. The remainder of the chapter covers thermoregulation and communication in far less detail, the bias reflecting the available literature on these three areas.

Flies have very much taken a back seat to bees when it comes to pollination, but many plants depend on them, particularly in the more northerly latitudes. Pollination is perhaps usually thought of as a by-product of hoverflies visiting the flowers of entomophilous plants to feed on both pollen and nectar, but with the pollen of some anemophilous (wind pollinated) plants also providing a source of

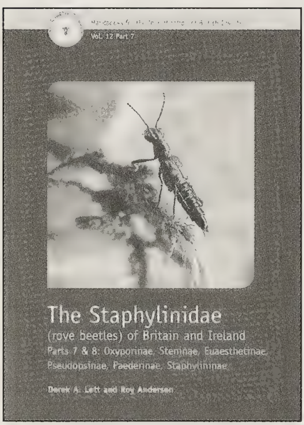
food, these visits may also result in pollination. The next chapter covers these and other aspects of hoverflies as pollinators, such as flower specificity and preferences, along with foraging patterns and the non-food usage of flowers. The descriptions of pollen, nectar and honeydew will be useful for those new to the subject. Also included in this chapter is a warning over jumping to conclusions with records of flower visitors which have not been corrected for flower abundance. The consumption of pollen and nectar is confined to the adults, but feeding strategies of the larval stages span the much wider fields of predation, phytophagy and saprophagy. Chapters 8 and 9 cover these feeding habits respectively.

The next two chapters cover the ecological aspects of hoverflies. Chapter 10 covers individual-scale aspects, such as oviposition, larval development, diapause, pupation and eventual emergence and population-scale aspects such as daily activity patterns, population stability, dispersal and migration. Chapter 11 covers the various types of habitats that hoverflies require and the ecological communities in which they live.

The book concludes with a look at the various connections between hoverflies and humans, including the use of hoverflies as crop pollinators, biological pest controllers and the utilisation of saprophages to monitor and clean up organic waste. The use of hoverflies as a flagship group to represent an entire community in habitat conservation efforts is also discussed as is the need to control certain phytophages which are regarded as pest species of economic crops.

The authors' intention was to produce an introduction to hoverflies with enough detail such that those with experience will still find something of interest. This aim has been achieved. The book is aimed at motivating readers to make contributions, fill gaps and extend existing knowledge of the hoverflies. This aim has also been achieved. Plenty of ideas and possible directions for both present and potential future hoverfly researchers can be found within and it is anticipated that this publication will stimulate further interest in the family.

JOLYON ALDERMAN



The Staphylinidae (rove beetles) of Britain and Ireland Parts 7 & 8: Oxyporinae: Steninae, Euaesthetinae, Pseudopsinae, Paedarinae, Staphylininae. Handbooks for the Identification of British Insects Vol. 12 Part 7 by Derek A. Lott and Roy Anderson. 340pp. 190 colour plates on 32 pages prepared by James Turner, 429 figures. Published 2011 for the Royal Entomological Society by the Field Studies Council. 245 × 175mm. Soft cover. Price £49.00. ISBN 978 0 901546 92 0.

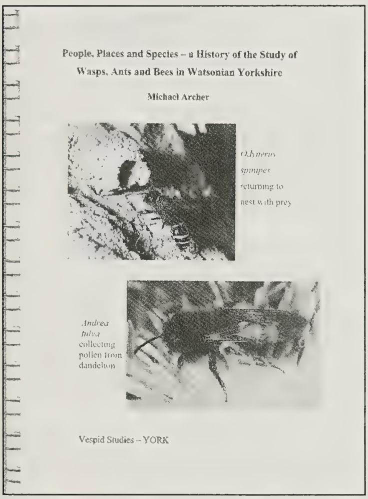
This comprises the second of a series of user-friendly keys to the adults of all the species that have been reliably recorded as established breeding populations in the British Isles designed in a format to enable the accurate identification of Staphylinidae – the largest group of beetles likely to be encountered in the British Isles. There are the usual informative chapters on general morphology, biology and advice on collection and preservation. Keys to subfamilies and a systematic checklist are followed by the bulk of the handbook comprising 260 pages of species keys with 429 accurate and realistic figures showing diagnostic characters.

Species accounts provide further information on differences between similar species, summaries of habitats, geographical distribution and biology. The handbook concludes with a bibliography of references, index, and finally 32 pages of excellent colour plates by James Turner provide large-scale photographs of set specimens of 190 species – a generous proportion of almost 60% of the species included in this volume.

As well as consolidating the many and varied sources of data published since Tottenham's first 1954 RES volume (as evidenced by the nine pages of references) there are many updated and new keys detailing many of the more difficult species complexes. This makes this volume the most current British single reference source available and a must for any coleopterist with an interest in the Staphylinidae.

Sadly, history has repeated itself in that the senior author, Derek Lott, has not survived to receive the acclaim so richly deserved for such a classic inspirational volume.

N. F. HEAL

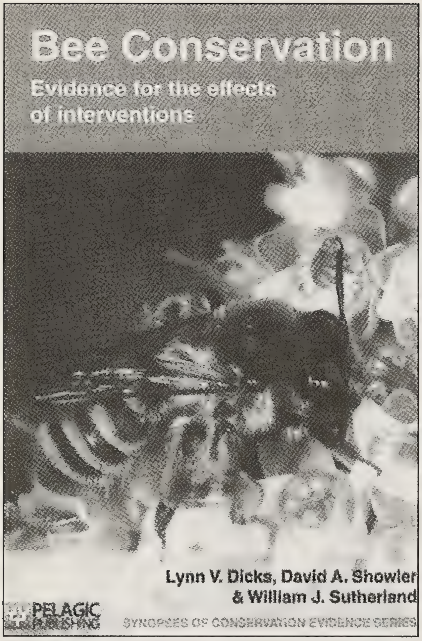


People, Places and Species – a History of the Study of Wasps, Ants and Bees in Watsonian Yorkshire by Michael Archer. 78pp, with coloured and black and white pictures. Quacks Books, 2011. Softback. £3.00 plus £1.00 p&p available from the author.

This book forms part of the Yorkshire Naturalists' Union 150th anniversary celebrations. The Introductory section (nearly 50% of the book) gives lively accounts of the entomologists who have contributed to recording the county's hymenopteran fauna, covering four time periods: the 19th century, early and mid 20th century and late 20th century (1980 to 2009). The story begins with Edward Saunders and the Revd Frances Morice in the mid 19th century (fuzzy black and white photo portraits, though it could just be their beards) through to the present period with more familiar names such as Austin Brackenbury, John Burn, John Coldwell, Bill Ely, Peter Skidmore, Richard Smith and Derek Whiteley and Michael himself (photos increasingly in colour). Each person's account includes information on where, when and briefly what they collected, so a picture gradually emerges of species distributions and where the most interesting, species-rich localities are in the county. Modern hymenopterists have had the twin fortune of better transport and better identification guides and so have recorded more extensively over the county.

The species section describes the history of the discovery of the Yorkshire aculeate fauna and the problems that recorders, both past and present, face when assembling the perfect database of records. This section is well-worth reading by anyone aspiring to be a county recorder. The book concludes with a series of tables showing when the 338 species from Yorkshire were first found during each of the four time periods and the first recorder for each species.

JOHN BADMIN



Bee Conservation, evidence for the effects of interventions by Lynn V. Dicks, David A. Showler & William J. Sutherland. 139pp. Pelagic Publishing, 2010. Softback £19.99. ISBN 978-1-907807-08-8.

This interesting and thought-provoking book is the first in the *Synopses of Conservation Evidence* Series that aims to make biodiversity conservation more evidence-based through a comprehensive assessment of relevant research literature. The book's focus is bee conservation. The evidence-based approach is widely accepted in medicine and the Cochrane Reviews on whether certain types of drugs or novel surgery techniques significantly improve patient care have proved their worth. It will be interesting to see how successful this approach is when applied to ecological questions and the answers it produces. Chapters in the book cover bee conservation in relation to residential and commercial building programmes, changes in agricultural land use practice, agricultural and forestry pollutants, invasive non-native bee species, problematic native species, and captive breeding of pollinators.

This is timely. For example European agri-environmental schemes have so far delivered moderate biodiversity gains despite huge amounts (30 billion Euros) of expenditure by governments across the EU. Too little research has been applied to analysing the outcomes. For example it is not yet clear which are the most effective ways of maintaining bee species richness whilst maintaining farming outputs – flower-rich field borders, large blocks of set-aside land or the flower-rich corridors proposed by Buglife (or combinations thereof).

Nest boxes for bees are discussed. Many conservation organisations are selling nest boxes for bumblebees, partly as a way of raising our awareness of bumblebee decline, but the evidence shows current nest box designs are pretty useless with extremely low rates of colonisation (yet Sladen in the early 1900s was apparently a whizz at this, achieving moderately high success rates). Now that we know this, we can at least move forward. The most effective nest boxes require the addition of 'the natural aroma of small mammal urine' so selling these to the general public is going to be a tricky one!

By contrast, the results of 29 studies have shown that nest boxes for solitary bees really do work, with three studies showing the numbers of nesting bees can double over three years with repeat nest box provision. One of the first to advocate conducting meta-data analyses of conservation practice is the UK entomologist Andrew Pullin and it is good to see his ideas taken up at last. The book is well worth a read, with some useful gems of information. There is a linked web site that provides free access to the text of the book and more information about the project at *www.conservationevidence.com/browsesynopses.aspx*.

JOHN STEWART

THE SOCIETY'S PUBLIC LIABILITY INSURANCE

In 1997 the Society extended its third party liability insurance for cover in respect of official Society events to include field work carried out by members as part of their personal activities. It was expected that this would cover the insurance obligations, which accompany applications for collecting and recording permits in many cases.

The Society has received a number of queries regarding the scope of the cover provided and this notice will hopefully clarify the position.

At events arranged by the Society and its sister organisations, Dipterists' Forum, BMIG, and BWARS, public liability insurance is in place which covers injury and damage to third parties arising from the activities of members and guests. Events include both field meetings and indoor events such as workshops and exhibitions. The cover provided is £5,000,000. It is important that permits for field meetings are issued in the name of the Society, or sister organisation, or to an individual on behalf of the Society, not in the name of the leader of the meeting.

The Society's insurance policy also provides £5,000,000 of public liability insurance to individual members of the Society and sister organisations, in respect of their own field work and entomological research which is not part of a Society activity, providing this is undertaken in the United Kingdom and is not carried out with a view to financial reward.

Members who are contemplating carrying out field work on a paid basis are specifically excluded from this cover. We have now procured an arrangement by which such members can approach our brokers directly to obtain individual third party liability cover under our policy. This will incur the payment of an additional premium by the member concerned. We understand this will result in a very marked saving compared with obtaining this cover through a fresh policy.

We must emphasise that the cover referred to above is Public Liability Insurance and does not include Professional Indemnity, for which separate arrangements have to be made.

The Society's insurance policy number is,

Royal Insurance H2/RKE274258-7.

Our brokers are,

Lansdowne Woodward
Princes Court
Ferndown
Dorset
BH22 9JG
(Tel. 01202 874989)
www.lansdowne-woodward.co.uk

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